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Jaguar Land Rover INGENIUM

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☑ AJ200D diesel engine rebuild procedures

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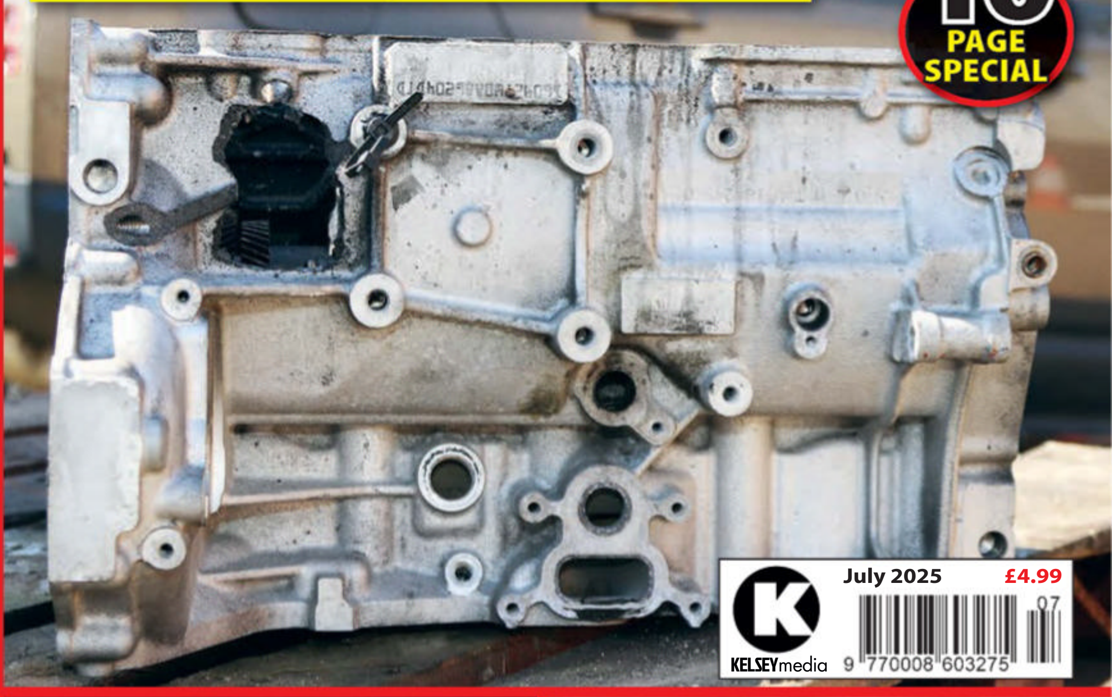

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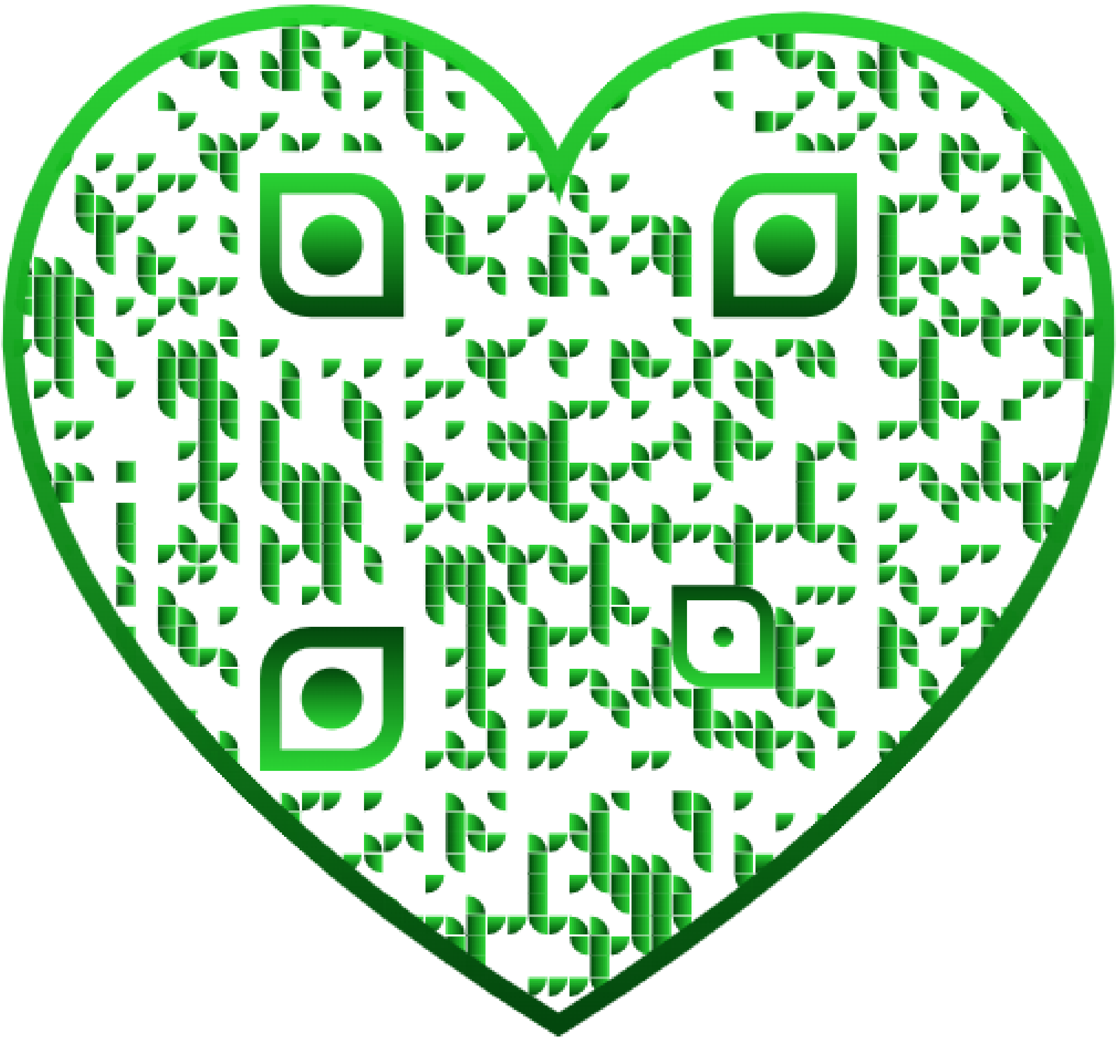

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Ford on the move

▶ As you can see opposite, we have produced our latest 'yellow' book on the Ford marque. I grew up with Fords, learning how to fix my Ford Escort Mk2 (first car) back in the early 80s. Taking the carburettor off to see how it worked, changing spark plugs, servicing. It was all fun back then. Except for the rotten floor pan, which took many weeks of drying out, using body filler to try to stop the rust and leaks. With more confidence in my driving, I hankered for extra power as the 1.1-litre engine was slow. The Escort was swapped for a Capri 3.0 Ghia auto. Now that was a car to love.

For me, though, modern Fords don't grab my attention as they once did. With the Fiesta finished, plus having to avoid buying any second-hand Ford with the 1.0 EcoBoost engine – and the range of new EVs hitting the market – I've lost interest in the marque.

My local Ford dealership has the 'new Capri' sat outside on the grass in front of the showroom to gain exposure from passing motorists, with the words 'The NEW Ford CAPRI' in big letters stuck to the side panels. I just shake my head as I pass – that's never a Capri in my eyes!

I did hire a Ford Puma a few months ago in Spain. It had the 1.0 EcoBoost Hybrid engine mated to a 7-speed automatic gearbox. ST-Line spec, it had all the modern equipment – the huge illuminating Puma symbol shining down from the door mirrors was a highlight at night. It drove really well with perfect adaptive cruise control – better than the latest Vauxhall Mokka. And the Puma styling is great. However, I found the corners of the front wings so high I couldn't see where the kerb was when parking (it was LHD so maybe I needed more time with it). But the Fiesta was a better city car I feel. What does everyone else think – are you still buying Ford cars?

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Chris Randall

1968-2025

▶ We are all deeply saddened by the news that *CM* contributor, Chris Randall, passed away on Saturday May 31st. Chris bravely telephoned me in early March to say he had a terminal disease, and doctors had given him three to six months to live. Chris was just 56-years-old.

Chris was a true professional. He had a distinctive writing style and if he said he was going to write a particular buying guide or in-depth feature, he'd make progress with it immediately – and more often than not, copy was in my inbox within 48hrs.

Even though Chris worked for the Government since he was 17, starting in the Highways Agency, Chris's love for cars was from an early age – he kept most of his childhood Dinky collection. Having reached the highest level in the Civil Service (SEO), Chris decided that it was time to do something different. As he was passionate about cars, why not journalism – there was no looking back. He had a list of magazines he wanted to pitch to and started with Haynes in 2011. A manual takes a year to produce and in 2012 the Volvo V70 2007-2012 Workshop Manual became Chris's first assignment (of many).

A year after starting at Haynes, Chris made himself known to the car magazine world. I took him on to write a few buying guides for *CM*. He liked writing *Used Car Focus* as the feature was called back then. In fact, Chris produced 38 buying guides for *CM* from the May 2012 issue (Mercedes-Benz A-Class).

Chris also volunteered to write about newly-released or forthcoming automotive technology. His first feature about the legalities of upgrading vehicle lighting was published in the December 2014 issue.

Chris gained work at various other motoring titles and online services, including *Auto Italia*, *Classic & Sports Car*, *Classic Car Weekly*, *Classic Cars*, *Honest John*, *Total 911* and *The Telegraph* newspaper to name a few.

In 2014-15, Chris worked alongside Mike Brewer and Edd China to produce a new Haynes manual called *Wheeler Dealers Car Restoration Manual* (10 car restoration projects). In 2017, together with Haynes, Chris compiled the *Building a MINI* (2001 onwards all models) Operations Manual involving the staff at Plant Oxford – an insight into the manufacture and production.

Last year Chris wrote his own book, *The Car Lover's Guide to London*. The potted history of some big carmakers that started in London – Aston Martin, Bentley and Rolls Royce to name three – Chris visited the original buildings to learn about their automotive past, taking images to illustrate how the buildings had survived today.

Thanks, Chris, for your hard work. Our thoughts are with his wife Rebecca and his family.

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We are sorry, but apart from material sent to *Help!* or *Diagnostics Doctor*, not all correspondence can be replied to personally, though everything is read carefully. Emails will be treated in the same way as ordinary mail – the editor is not normally available to provide instant replies.

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The Peter Simpson COLUMN

Peter's had a rather frustrating month, and one that many of you will relate to.

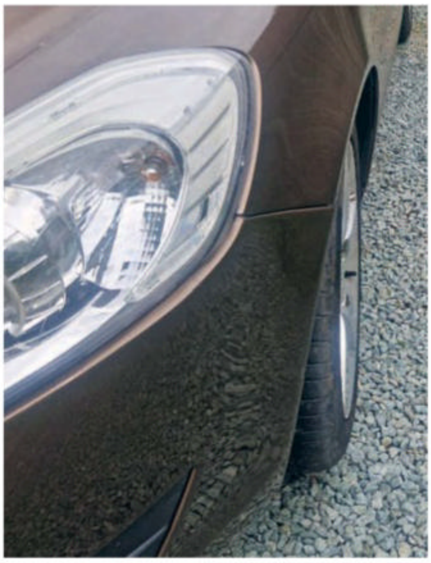
▶ As I've mentioned here before, April is MOT month for the Simpson family cars. All, of course, get checked prior to submission, and to be fair, I do usually spot anything that might need doing.

First up was our Up! – specifically my daughter Katie's car. No problems; just an expected advisory for a bit of light cracking on the front tyres. Then it was the turn of the family do-everything Kia Sorento; again no issues apart from a deteriorated anti-roll bar link dust cover which I'll attend to in the fullness of time. The Volvo 240 isn't currently on the road. That's not because there's anything wrong with it; rather it's running as a project in our sister magazine *Classics World*, and it makes sense for it to stay out of use while this is undertaken. I'm also not currently using the Rover 827 Coupe.

That left the Volvo C70. A couple of days before this was due in, I heard a nasty cracking sound from the nearside rear, followed by a lot of knocking. It didn't take long to find out what was wrong; the top suspension mount (on to the rear wheelarch) had broken off. Then, when I started what I thought was going to be an hour's repair at most with removing the road wheel, one of the wheel studs sheared off. These aren't, it seems, available separately, so the only option was a complete new hub and wheel bearing assembly. Fitting that turned into a major task, and one for which I had to purchase a grinder. You'll be reading about it in *Our Cars* in due course.

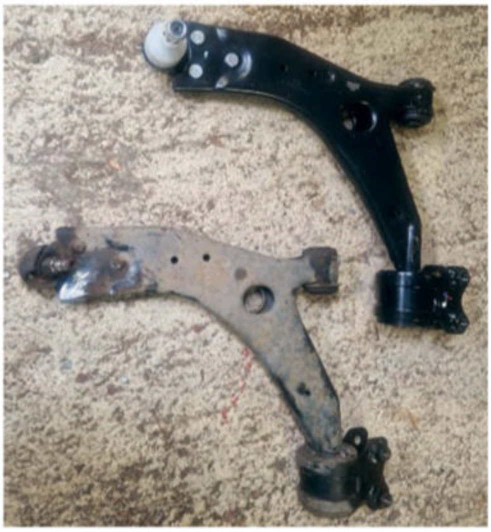
But there was another issue. For some time, I'd noticed a creaking sound on steering – at first it was intermittent, then it gradually became more regular. It was also to some extent weather-dependent – it seemed worse in warm weather. I assumed it was a bit of dryness in the top bushes.

But it wasn't. Rather, the nearside front lower balljoint rubber had split, causing the joint itself to rust. There was no excess movement – in fact if anything it was tighter than normal. But because of that corrosion, it clearly wasn't safe and needed renewing.



The C70 uses a Ford Focus platform. Some old-school Volvo fans disapprove, but to me that's actually a good thing as the Focus underpinnings are excellent from a driveability point of view. When it comes to changing the bottom joints there are two ways of doing it. One is to change the whole lot – arm, bottom joint and inner bushes.

Alternatively, you can buy the joint on its own, though because the original is rivetted to the arm, you need to grind/cut through said rivets and replace them with the three nuts and bolts that come with the joint. Instinctively, my initial plan was to change just the joint – I hate the waste that's involved in renewing rather than repairing. Oh, and I'd got my nice new grinder to use.



But I soon gave up on that idea when I realised that the arm would still have to come off, and the inner bushes looked to be definitely past their best. It was going to have to be a complete new arm.

So, I ordered one online from a local supplier by, as is usual, keying in the car's registration number. This offered three options, but only one that was in stock. There was no indication whatsoever that there may be different parts depending on age. I ordered it online, collected it, and fitted it. During fitting I did of course check the old arm against the new one, and as you can see from the photograph I took at the time, it looked correct.

But once I'd fitted it, it was clear straightaway that something was very wrong. Look at the front-on view, and see how the nearside front wheel is angled out at the front. The steering is supposed to be straight-ahead, but the steering wheel was actually about 20° off. Oh, and it being off like this caused the DSTC (stability and traction control) light to come on, because it put the sensor in the steering wheel outside of its operating parameters.

First thoughts were that I'd somehow got the arm's position on the front chassis leg wrong. I hadn't; that's simply not possible. Then I took some advice from a guy who knows Fords, and the likely cause emerged. In around 2006/7, Ford changed the size of the bottom joint slightly, from 18.8mm to 21mm. This also of course affected the C70s, though because the C70 was introduced in 2006, very few were made with the earlier-size joint. The C70 changeover occurred from chassis number 2742. However, a lot of aftermarket suppliers data lists don't seem to recognise this change. The arm I bought, for a car that I'd given details of online remember, was for the earlier type of arm. Which was used only on less than 2800 C70s sold in 2006/7. Mine is a 2011, and according to the chassis number, it's more than 120,000 into the production run.

To their credit, the supplier didn't quibble about taking the part back for a refund, despite it having been fitted and the car used. In fact, they checked online, and confirmed that there were two types, and their listing was incorrect. This is, though, definitely something to watch out for. No permanent damage was done, though resetting the DSTC system meant a trip to the garage for the sensor to be reset.

By and large motor factor parts identification by reg number systems are pretty reliable. But because of that reliability, people rely on them, and it's therefore extra-confusing when the wrong part has been supplied and, as here, the only difference was a 2mm larger ball-pin.

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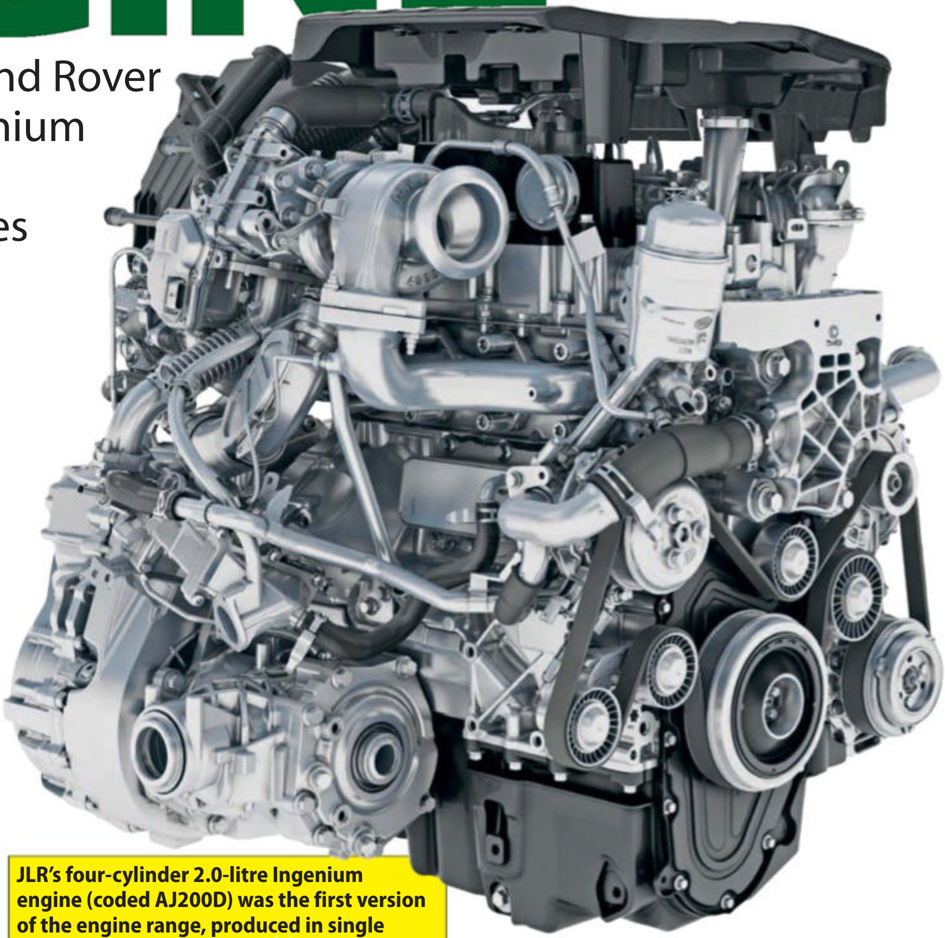
JLR INGENIUM ENGINE

A decade after Jaguar Land Rover debuted its all-new Ingenium 2.0-litre diesel engine, **Rob Marshall** investigates if its poor reputation for reliability is justified.



JLR's four-cylinder 2.0-litre Ingenium engine (coded AJ200D) was the first version of the engine range, produced in single (TD4) or twin (SD4) turbo formats.

Considering that the internal combustion engine has been powering motorcars for almost 140 years, one would have thought that vehicle makers would have perfected reliability. Yet, the opposite is happening. Engine remanufacturers seem busier than ever and there seems to be no end of disgruntled customers, complaining about serious and costly mechanical failures even on fairly youthful vehicles.

Conflicting requirements

There are, of course, many reasons for this situation. Some owners wish to give manufacturers a kicking, for producing 'sub-standard' products, without appreciating that their lack of mechanical empathy and reluctance to maintain said engine might be the real culprit. As colleague Humble commented in our May issue, most usual car troubles can be avoided, by doing things properly and by the book.

Then, there are the legislators. Whenever you peer into an engine bay and wonder *'Why on earth did they do it like that?'*, tailpipe emissions is the likely answer. Without complying with mandatory Euro emissions legislation, carmakers would not be allowed to sell their products. Separate from this is the obsession with lowering carbon dioxide output. This can result in not only the manufacturers being fined for every car registered but also the car owner would be saddled with taxation charges that could make the car model uneconomical to run.

While this mandatory obsession with emissions and efficiency is laudable morally, it has technical consequences. Engine downsizing is a recent trend, where more power is squeezed from fewer ccs. Means of reducing weight and internal friction have introduced features that have given owners and technicians headaches. Typical examples include direct injection, dual mass flywheels and Belt-in-Oil timing systems. This is before we consider after-treatment systems that can have a detrimental impact on engine life, such as Exhaust Gas Recirculation (EGR) and particulate filters.

The AJ200D engine was introduced first in the 2015 Land Rover Discovery Sport.

Jaguar models soon inherited the AJ200D engine. In particular, the F-PACE was the first to employ a 163PS E-Performance diesel version.

Should the MIL be illuminated, especially if accompanied by a limp-home mode, consider that the DPF will not regenerate actively as a self-preservation measure. Therefore, have the underlying problem resolved quickly, before further damage (and expense) results. Similarly, never ignore any 'Service Required' messages, which can appear due to deteriorated engine oil.

Introducing the JLR Ingenium family

Especially since the 'Dieselgate' exhaust emissions scandal of 2010, car manufacturers knew that engines had to be developed with stringent future emissions standards in mind. When the Ford Motor Company sold off its family silver, two of its former Premier Automotive Group Brands, Jaguar and Land Rover, found their future access to other brands' engines under threat.

With the subsequent creation of Jaguar Land Rover (JLR), its new owner, the Tata Group, invested £40 million at its Witney (Oxfordshire) Powertrain Engineering facility to develop a new range of low-emission, lightweight but powerful petrol and diesel engines. Evidence that JLR intended this new family to be modular includes the blocks sharing the same bore and stroke dimensions, with each cylinder possessing a 500cc capacity. This decision gave JLR the ability to develop smaller, or bigger, engines to meet future legislation quickly and more economically than requiring new combustion engines.

The first fruit that emerged from the brand-new £500m production facility, based just outside of Wolverhampton, West Midlands, is the focus of this feature: a 2.0-litre 4-cylinder diesel engine (initial code AJ200D). Compared to the preceding Euro V emissions class 2.2-litre engine (the Ford/Peugeot developed DW12 unit), JLR championed an almost 20% reduction in internal friction. Its engineers achieved this by having the cam and balancer shafts running on roller bearings, instead of being machined directly into the block, adding computer-controlled variable oil and water pumps and switchable piston cooling oil jets, among numerous other refinements. The fact that the Ingenium AJ200D weighed up to 80kgs less than competing units at the time was a significant technical achievement.

Mounted longitudinally beneath the bonnet of Land Rover Discovery Sport (which replaced the Freelander) from April 2015, the 2.0-litre diesel Ingenium (designated 'TD4' at the time) was offered as a single turbocharged unit, developing either 150PS (129g/km and up to 57.7mpg) or 180PS (139g/km and up to 53.3mpg). From the start, these new engines complied with Euro VI legislation, boasting not just diesel particulate filters (DPF) but also Selective Catalytic Reduction (SCR) and high and low-pressure exhaust gas recirculation (EGR) circuits. By the end of the year, the 150 and 180PS engines were mounted transversally into the Evoque and the new Velar (a model that JLR viewed necessary to slot between the Range Rover Sport and Evoque in an increasingly complex Land Rover range), bringing those models into full Euro VI emissions compliance.

Badged 'SD4', an extra turbocharger was added for the new Discovery and the 2017 model year Range Rover Sport as the latter model's smallest engine, which JLR claimed at the time produced V6 levels of performance from two fewer cylinders. Indeed, power was upped to 240PS and 500Nm of torque (45.6mpg on the EU combined cycle and 164g/km of CO_2). Numerous detailed changes were made, not least being different pistons and crankshafts. The SD4 twin-turbo 2.0-litre diesel was offered soon after to Jaguar F-PACE, XE and XF, with an economy-minded single-turbocharged E-Performance 163PS/380Nm version, achieving up to 59.2mpg.

By 2019, the 180PS 2.0-litre Ingenium had been upgraded in the Jaguar XE to comply with Euro VI RDE2 legislation. While diesel sales were diminishing, JLR stated that its Ingenium diesels had, approximately, 25% better fuel economy than petrol engines, produced around 15% less CO_2 and emitted around the same amount of NOx. For drivers covering over 12,000 miles a year, the manufacturer stated openly at the time that a diesel engine is often the most cost-effective and environmentally-friendly choice. Many motoring writers agree (at least privately) that this stance remains true today.

By the time the new Jaguar F-PACE was launched in 2020, Mild-hybrid technology appeared. Comprising belt-driven starter-alternators (see *CM* May 2025 issue), the power increased on the 150PS version to 163PS (163g/km), and up to 45.4mpg being achieveable, with the larger single-turbo version seeing a hike from 180PS to 204PS, which featured steel pistons for the first time. This larger capacity unit found itself soon after in the XE saloon. The twin-turbo version was restricted to 200PS, offered only in the Land Rover Defender 110 from the 2020 model year.

ROB'S TOP TIP

JLR's oil change intervals are too long.

Both the single turbo 163PS (badged D165) and 204PS (badged D200) MHEVs were updated for the 2023 model year (code AJ21) and remain in production. These latest versions remain covered under JLR's three-year, unlimited mileage, warranty. Therefore, should you experience any issues with those engines, approach your nearest JLR dealer for advice. This feature focuses mainly on the earlier 150/180PS TD4 single turbo and 204PS SD4 twin-turbo versions.

Is the Ingenium engine as bad as its reputation suggests?

With owners, the motor trade and even independent Land Rover specialists reporting serious mechanical failure of out-of-warranty examples, *CM* approached a firm that specialises in rebuilding Ingenium engines, full-time. Based in Whitchurch, Shropshire, NWS Motor Services claims to be Europe's leading independent Land Rover engine specialists and, after visiting the expansive site, we think it not an outlandish statement. Its engine remanufacturing and machining divisions have grown to a full-time operation, with Ingenium engines showing the highest demand. One might conclude, therefore, that Land Rover's all-aluminium home-grown engine is seen by the expert as a complete white elephant.

'Not at all,' reports Sales Executive, Josh Shipley, who explains,

'You must remember that the Ingenium range is a family and the 2.0-litre diesel is just one member.'

Josh reminds us that the Ingenium range is modular and features six-cylinder petrols and diesels, along with a three-cylinder petrol triple. He reports that his firm has not yet seen many of these other engines, indicating that they are reliable in service, although he admits that many of those examples remain covered under the manufacturer's warranty.

Even so, surely the evidence is in front of him, that its maker messed up royally with the 2.0-litre four-cylinder? Again, Josh defends JLR, stating that the 2.0 four-pot is not only the oldest and most numerous version that powers cars outside of the manufacturer's warranty but also the engine itself is a victim of exterior forces.

The first, Josh explains, are the lengthy JLR oil change intervals that can be up to 21,000 miles, or 24 months. The engine might just about survive, if the oil life was not being curtailed prematurely but this is not the case. Josh explains that, while the DPF regeneration process deposits a small quantity of diesel fuel into the oil by design, excessive quantities are doing so, causing the lubricant to degrade prematurely. Excessive DPF regenerations tend to be a specific issue on models, where the engine is mounted longitudinally, because the DPF is not close enough to the engine to get hot enough to burn off its soot particles quickly enough.

Josh also directs blame at drivers. While excessive short, low-speed journeys cause DPFs to block with particulates on all vehicles thus equipped, it does not help should a driver shut the engine down, while the system is mid-way through a DPF regeneration. While this might be excusable for a typical non-technical driver, more worrying is the already long service intervals being skipped and illuminated engine Management Indicator Lamps (MILs) being ignored.

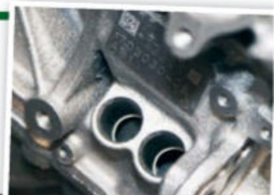
'The problem with this latter issue is that the DPF will not regenerate and self-clean, while this MIL is illuminated. This causes yet more problems, as the DPF fills. Eventually, the back pressure becomes so great that the engine will stop running', explains Josh.

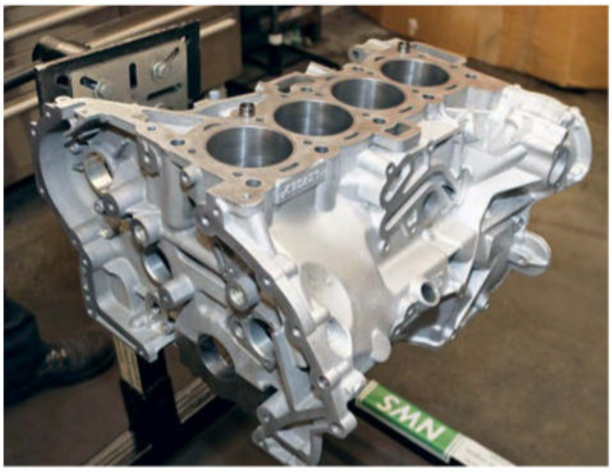
NWS Motor Services' position is that, while there is nothing wrong inherently with the 2.0-litre four-cylinder diesel AJ200D, deteriorated engine oil causes severe damage. Aside from the bores, which tend to be scored by oil degradation, the block and cylinder-head are robust.

When we pointed out that there will be disgruntled readers and JLR specialists who disagree, Josh highlighted that every NWS Motor Services customer, who receives a remanufactured engine, is given a revised oil change interval of 10,000 miles, or annually, plus instructions on how to treat the vehicle to ensure optimal DPF regeneration. Josh reports that these engines have proven reliable in service.

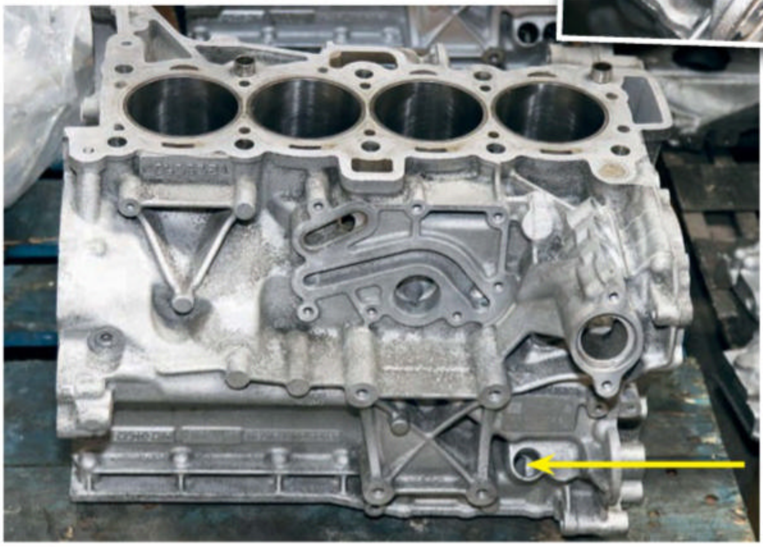
INSIDE THE AJ200D INGENIUM ENGINE

To show the Ingenium 2.0-litre diesel's internals, the following overview covers a single-turbo unit's reassembly. Torque wrench settings quoted should not be taken as gospel, because they can vary between engine specifications and applications. Therefore, verify that any figures quoted here are relevant to the vehicle on which you are working.





1 **This is how the basic remanufactured block should appear, after all machining and cleaning work has been completed. As with any engine rebuild, cleanliness is essential – even a single grit particle could curtail engine life. This longitudinally-mounted unit is from a Discovery Sport with its single turbo drain on the side.**

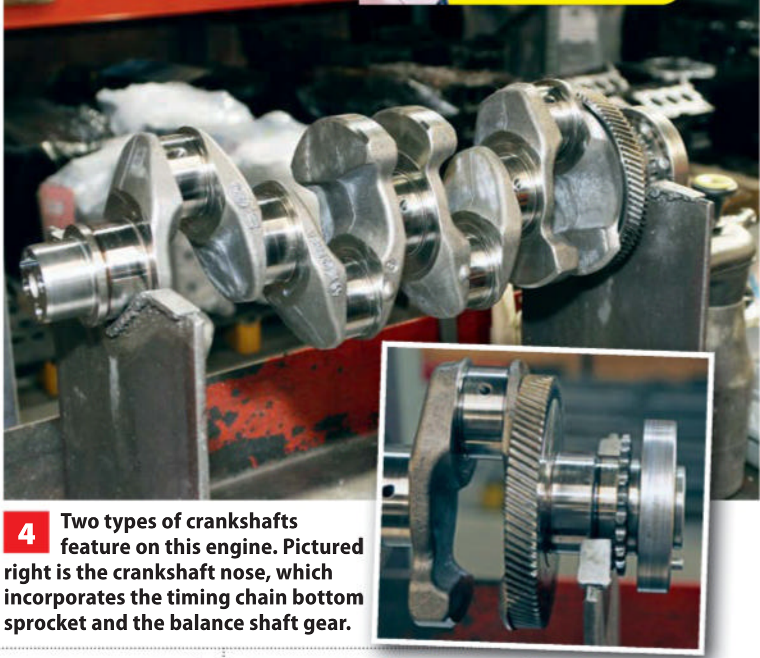


2 **On post-2021 blocks, you may find that this turbo drain has been relocated (as arrowed). Twin-turbo engines can also possess a pair of drain holes, as pictured inset (above).**

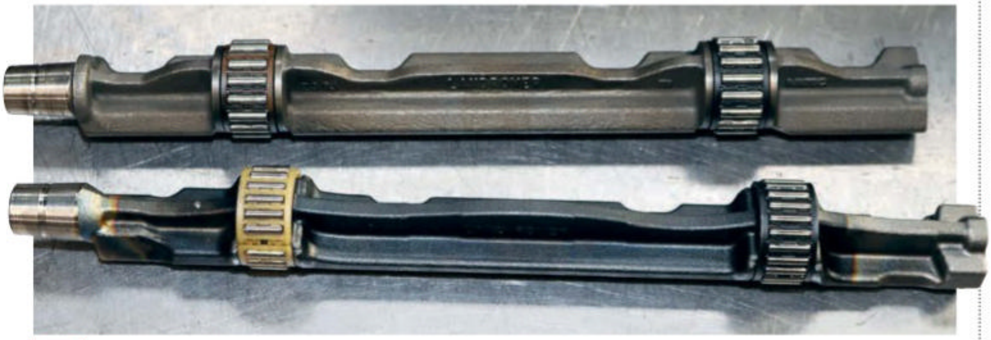
ROB'S TOP TIP

Keep an Ingenium's insides clean for a long life.

3 Aside from subtle differences between the blocks, there are four different types of sumps, depending on the application. While the main construction is the same, individual parts differ, depending on the specification and engine age. As with all quality remanufacturing, quality companies ensure that the parts they use are from reputable suppliers.

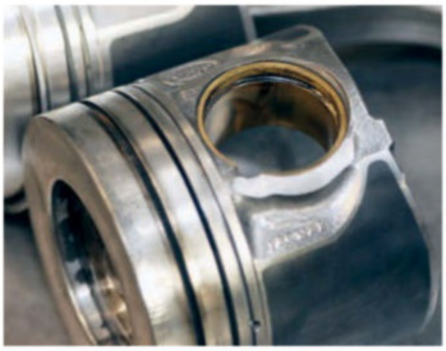


4 Two types of crankshafts feature on this engine. Pictured right is the crankshaft nose, which incorporates the timing chain bottom sprocket and the balance shaft gear.



5 Each 2.0-litre Ingenium diesel possesses a pair of balance shafts, positioned on either side of the crankshaft. They run in bearings, rather than directly in the block, to optimise CO_2 emissions. Correct timing is vital, otherwise, they can strike the connecting rods (See Step 35). Pictured top is an early shaft; below it is a lighter, later shaft that possesses different bearings. They can be interchanged.

6 The pistons and connecting rods also differ, especially between the single and twin-turbocharged engines. The twin-turbo piston can also be identified by the brass insert within the little end (see below).



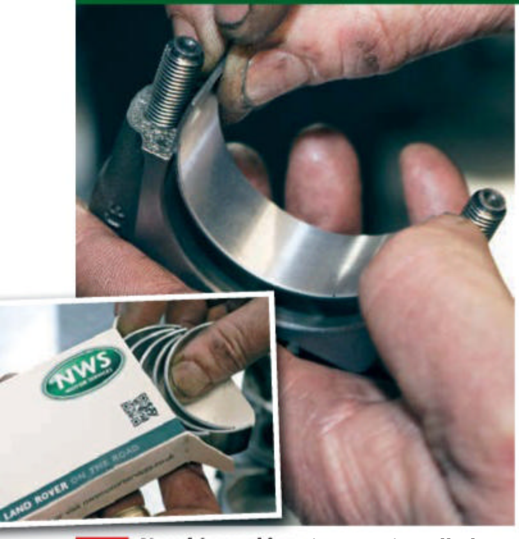
7 Depending on how damaged they were, the bores can be either machined, and oversized pistons installed, or new liners fitted with standard pistons. Either way, NWS Services fits new pistons. Prior to installing the two new compression rings, each one is inserted squarely into the block and the gap is measured.

8 The rings can be ground to size with a dedicated ring grinder, to ensure that the ring gap measures 0.004" per inch of cylinder bore.

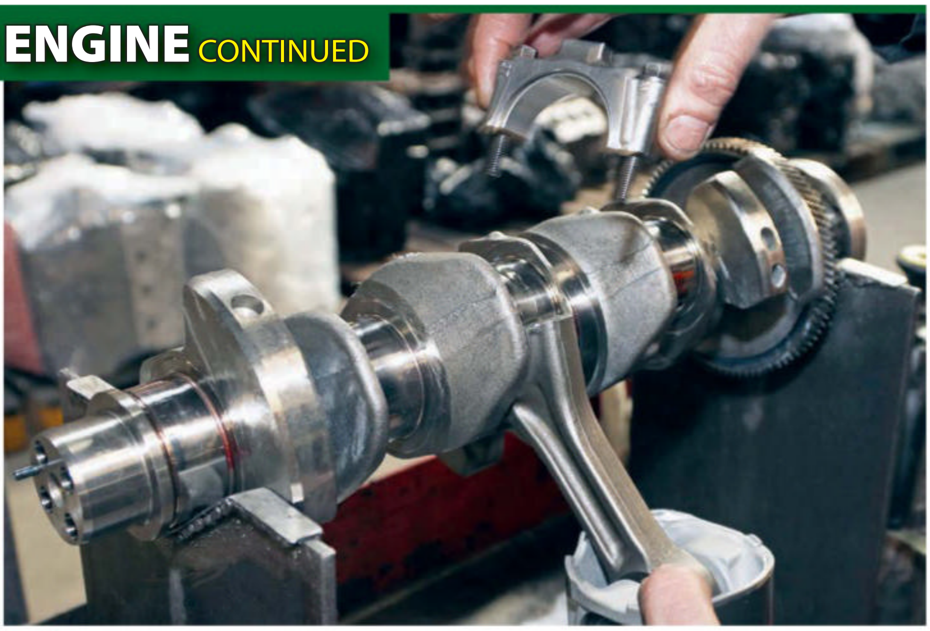
9 ▶ The compression rings are then installed into the piston ringlands, after the oil control rings have been fitted. As is convention, they must be installed the correct way up, as marked in Step 7.

⇨

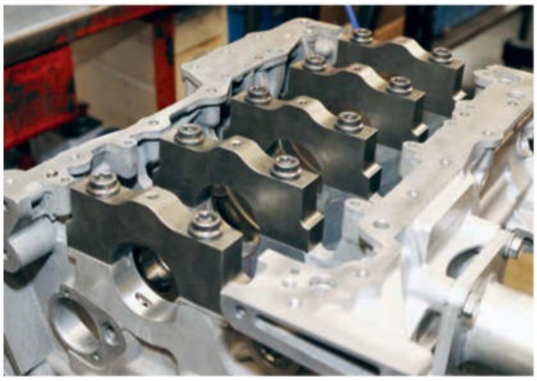
AJ200D INGENIUM ENGINE CONTINUED



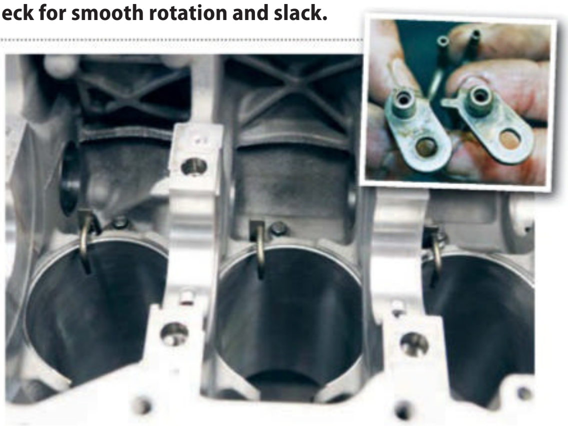
10 New big-end bearings are installed into the connecting rod caps, the sizes of which depend on the dimensions to which the crankshaft journals were reground.



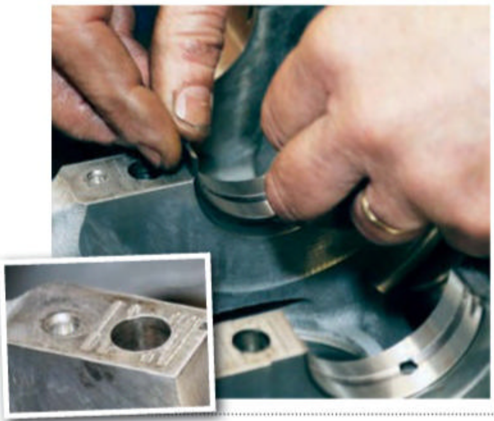
11 Before fitting these parts into the engine block, NWS Services lubricates each crankshaft journal with engine oil and installs the matching connecting rod in position. The engineer rotates the connecting rod by hand to check for smooth rotation and slack.



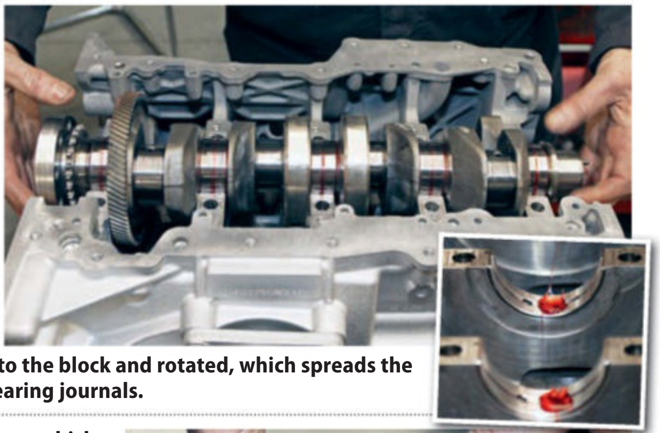
12 ◀ Moving to the engine block, the main bearing caps are kept in order, as they are removed. Their mating surfaces are cleaned with pre-oiled 200-grit wet-and-dry paper.



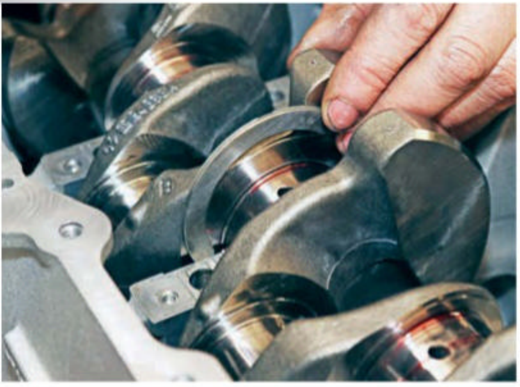
13 ▶ Before the pistons are refitted, their oil cooling jets are bolted back into the block. Note that there are two types fitted to the four-cylinder engine. Interestingly, the six-cylinder Ingenium engines possess twin jets.



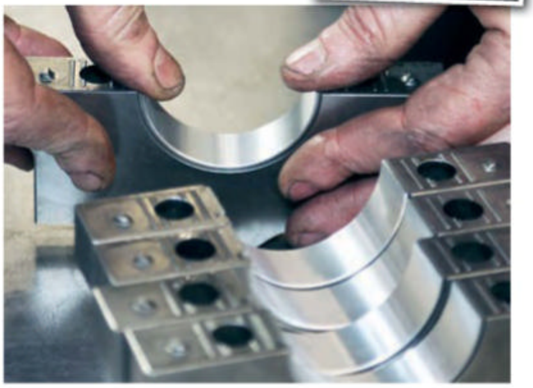
14 ◀ New main bearings are installed, again, sized according to the crankshaft journal. As is the convention, the shell bearings are retained by a groove in the block that engages with a tab on the bearing.



15 ▶ The shell bearings are lubricated with an assembly oil, containing a high level of viscosity improver, so it is sufficiently tacky to cling to the surfaces without dripping. The crankshaft is then lowered into the block and rotated, which spreads the lubricant evenly onto the main bearing journals.



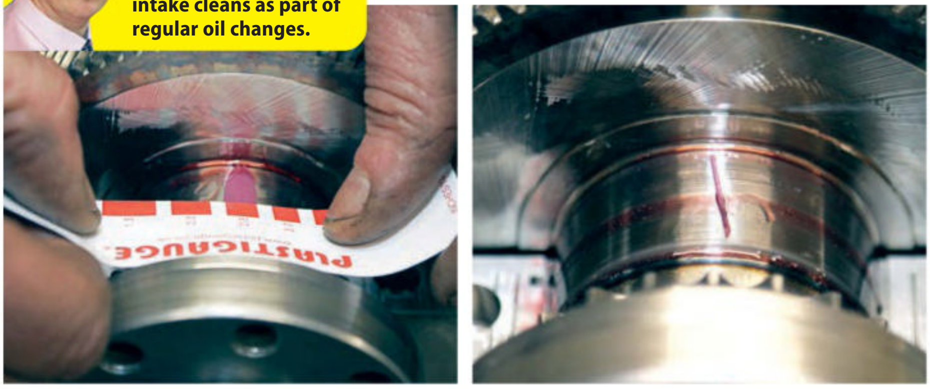
16 ◀ The thrust washers, which control the crankshaft end-float, are retained by cylinder three's main bearing cap. There is nothing unconventional about this method.



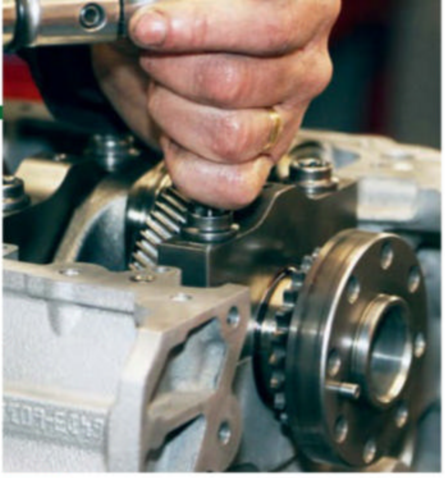
17 ▶ The main bearing caps also receive their shells, prior to being lubricated as per Step 15. To double-check that the crankshaft-to-shell bearing tolerances are correct, NWS Services conducts an extra check on all main and big-end journals, using a long-standing, but effective, technique.

ROB'S TOP TIP

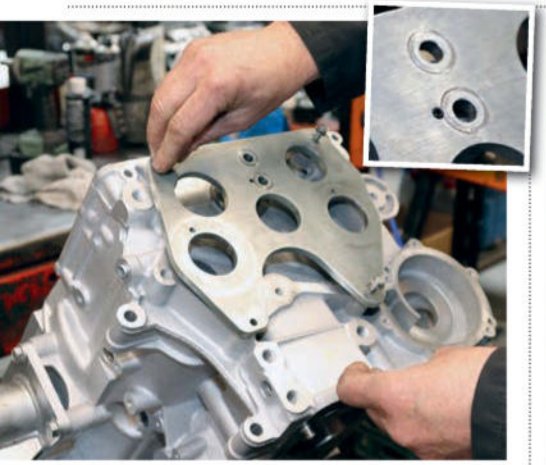
Consider oil flushes and intake cleans as part of regular oil changes.



18 The method involves using a Plastigauge. A sliver of a Plasticine-type material is placed onto the journal. When the caps are fitted and their securing bolts tightened, the Plasticine is squashed and its dimensions are measured afterwards to double-check the tolerances. Should they be too tight, oil cannot penetrate between the metal surfaces to lubricate them. Alternatively, oil pressure will reduce with excessive bearing clearances. This measurement of just under 0.0025" is fine.



19 All main bearings are torqued to their final settings. This is a fairly convoluted procedure on the AD200D and involves tightening each bolt to 25Nm, then 58Nm. It is then tightened by a further 135°, slackened by 180°, tightened to 25Nm, and then again to 37Nm, before the bolt is rotated 135° clockwise for the final time.



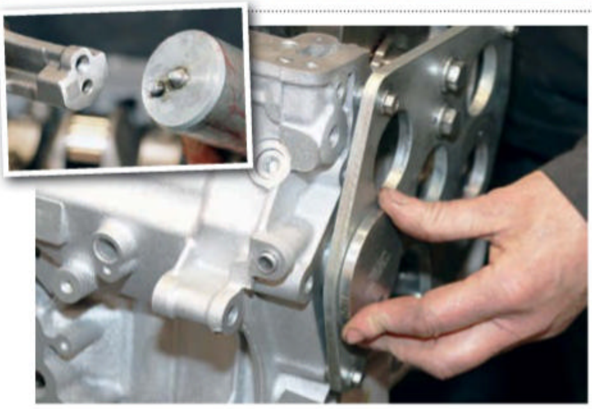
20 The balance shafts are fitted next but, to do so, a special tool is required, which is bolted to the block, noting the locating dowel.

21 A notable failure point is the bearing within the balance shaft drive sprocket, due, possibly, to deteriorated oil causing rapid wear.

22 This sprocket is lowered into the crankcase as another special mandrel-type tool is inserted into the block, which passes through the sprocket's centre bearing and holds it into position.

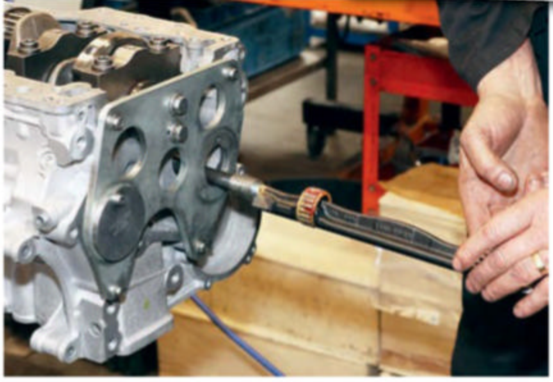
23 ◀ The other side of the mandrel passes through the opposing side of the block. The balance shaft end is then screwed into the tool, so it can be drawn into the crankcase. This task can be completed on the car but all models require the gearbox to be removed.

24 ▶ The needle bearings are lubricated with assembly oil, prior to the shaft being drawn into the crankcase.



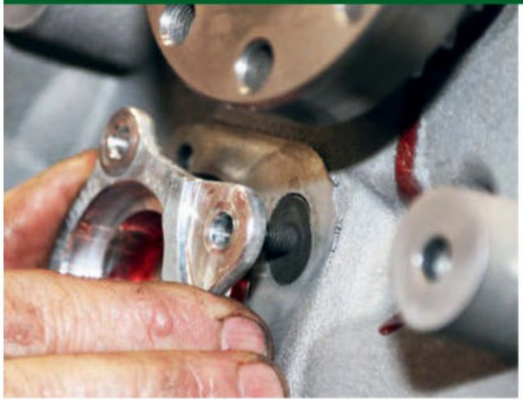
25 ◀ As the shafts must be timed, their positions are crucial. Once in place, the shafts are prevented from turning, by using a locking tool that comprises two locating pegs and an Allen key bolt.

26 ▶ The other balance shaft is installed, using another tool and the same technique.

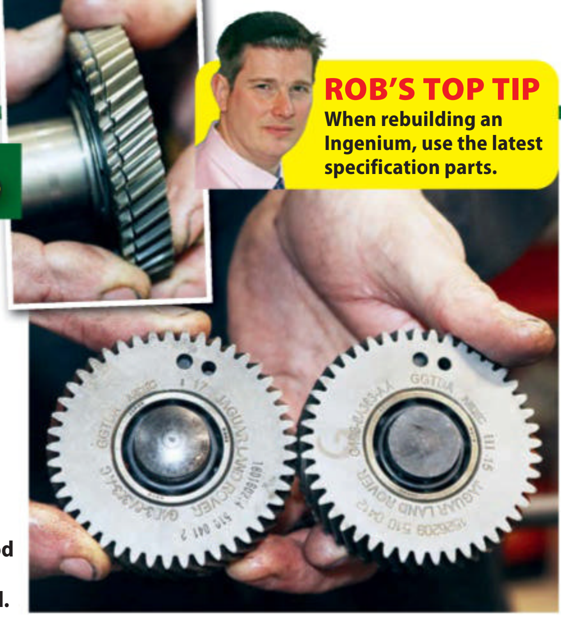


AJ200D INGENIUM ENGINE CONTINUED

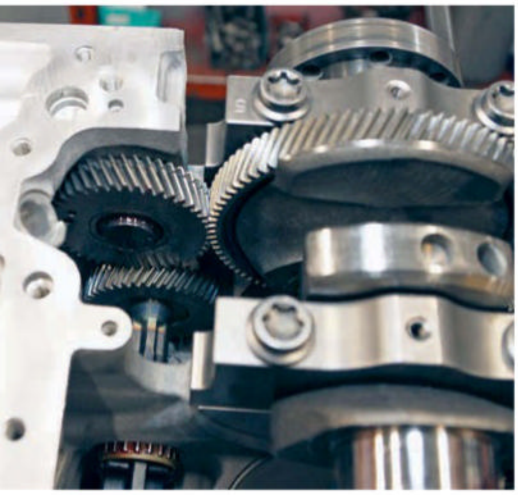
ROB'S TOP TIP
When rebuilding an Ingenium, use the latest specification parts.



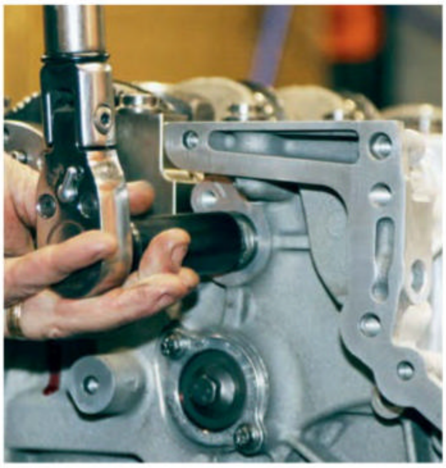
27 ◀ Each balance shaft is secured by an end cap, which is located within a recess on the crankcase. This bank includes the timing chain tensioner stud.



28 ▶ The crankshaft uses two drive gears to power each balance shaft. These can possess either a flat, or bulbous nose. Should the wrong type be fitted, there is a risk of the connecting rod striking it. This gear possesses a sprung drive; some types are solid.

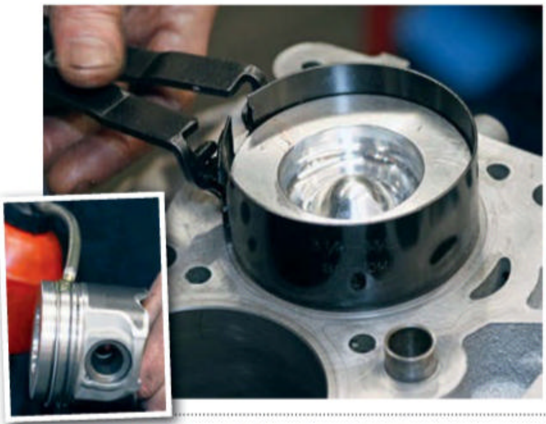


29 Pictured is the drive gear installed. Note how it meshes with the crankshaft and the balance shaft gear. These teeth can shatter, should the balance shaft bearings fail.

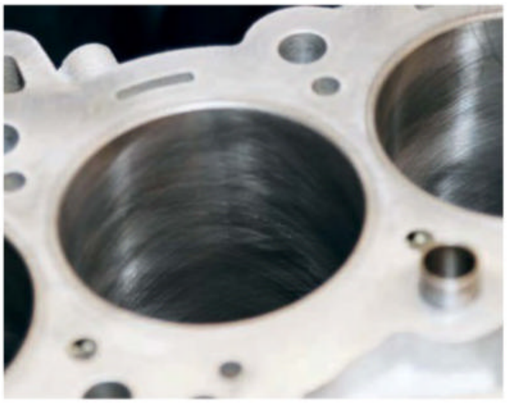


30 The drive gears are secured to the crankcase by a nut that is tightened to 55Nm. Note that the end cap for this balance shaft is fitted beneath. The centre nut holds the balance gear in place.

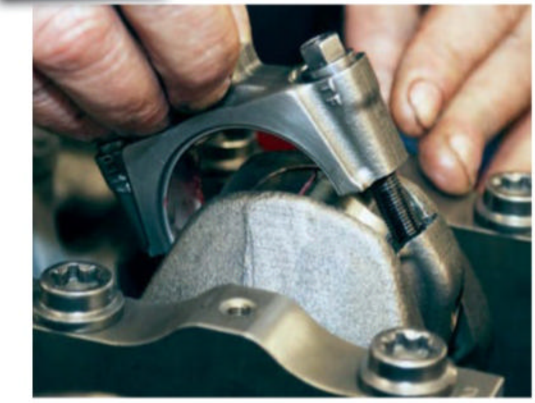
31 The balance shaft installation and locking tools can be dismounted from the crankcase from this point, now that both shafts are installed and timed.



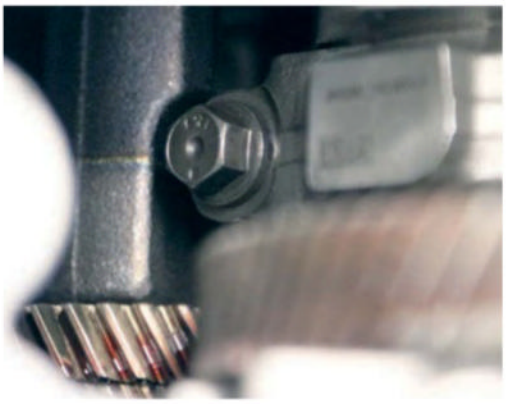
32 ◀ Once the compression rings are rotated, so their end gaps are around 120° apart, they are lubricated with clean engine oil, before being installed to the cylinder using a conventional piston ring compressor tool, with the arrow on each piston pointing towards cylinder number one.



33 ▶ The importance of correct bore cross-hatched honing cannot be under-emphasised, to ensure that the new piston rings bed-in as quickly as possible. It also helps to minimise oil consumption.



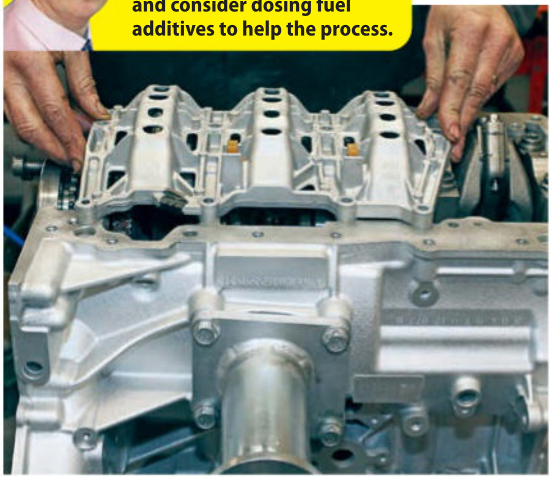
34 ◀ The big end bearings are fitted to the connecting rods and caps, prior to being lubricated, as per Step 15, and united with the crankshaft journals. After the Plastigauge measurements are verified, the connecting rod bolts are tightened to 20Nm, plus 120°.



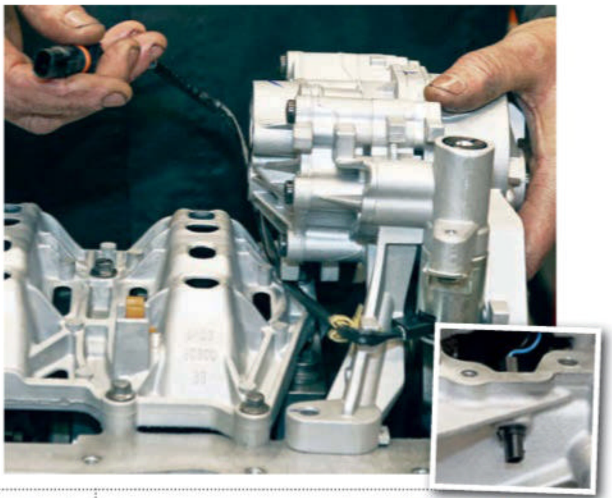
35 ▶ This picture shows the importance of correct balance shaft timing, because the connecting rods and big end bolts pass through the shafts' cutouts. Should the shafts not be timed accurately, the rotating parts would collide with catastrophic results.

ROB'S TOP TIP

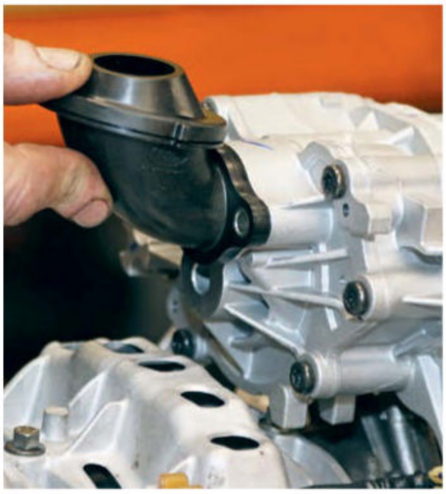
Observe DPF regenerations and consider dosing fuel additives to help the process.



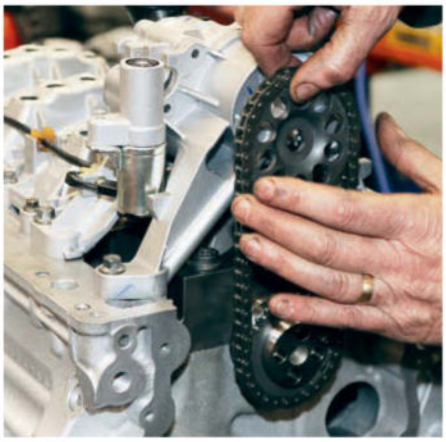
36 ◀ The baffle plate is installed next, noting that single turbo plates will not fit twin-turbo engines and vice versa.



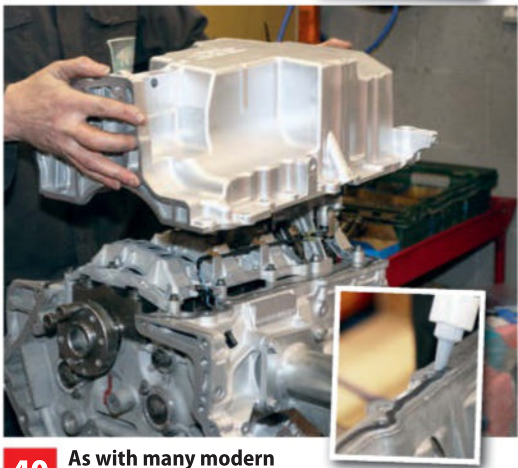
37 ▶ The combined oil and vacuum pump is installed next, after being primed with engine oil. The electrical connector's seals are oiled and pressed gently through the block. While NWS Motor Services reports that it has never witnessed one fail in use, it installs a new, genuine JLR unit in every remanufactured engine.



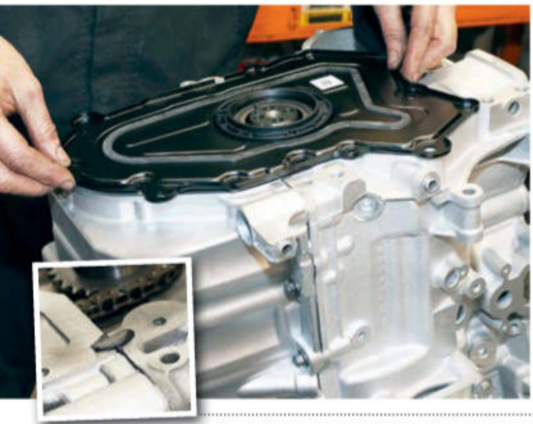
38 The plastic engine oil pick-up is secured by two bolts. Different types are used, depending on which one of the four different sumps is fitted.



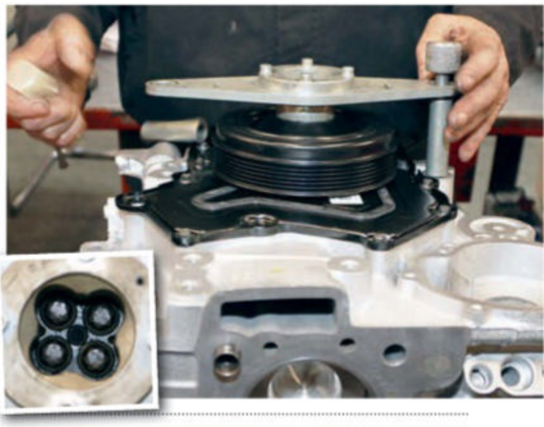
39 While oil flow is controlled electrically, the oil and vacuum pump is powered mechanically. The drive is provided via a chain and two sprockets. The crankshaft sprocket is held in position by the Front End Auxiliary Drive pulley.



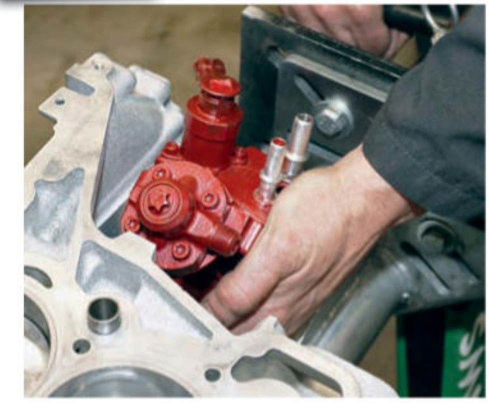
40 As with many modern engines, a liquid gasket is used instead of paper gaskets. NWS Motor Services recommends a light bead of JLR's branded sealant is applied to both sump and crankcase mating surfaces, before the bolts are fitted.



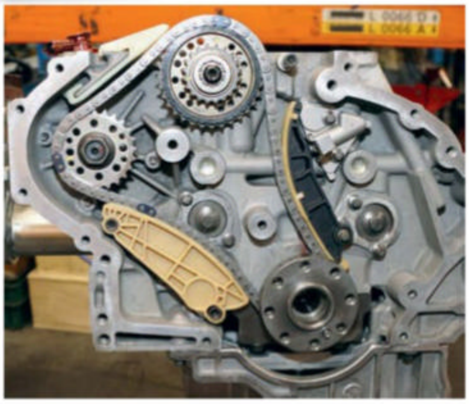
41 ◀ The front engine plate is sealed using the same product and methodology, noting that oil leaks could result, unless extra sealant is placed between the crankcase and sump joints. Twelve bolts hold the plate into position, which should be tightened evenly to prevent the steel pressing from distorting.



42 ▶ Installing the FEAD pulley requires bolting JLR locking tool 303-1630 to the crankshaft nose, which prevents the crankshaft from rotating. The four securing bolts can be accessed through the tool centre. These are tightened to 37Nm, plus 90°. The tool remains in place to facilitate fitting the timing chain kit.



43 ◀ A dummy fuel pump (painted red in this case) is installed so the timing chains can be fitted. Few (if any) engine remanufacturers will sell an engine with an expensive replacement pump. This Ingenium engine uses the popular Bosch CP4 unit, retained by three bolts.



44 ▶ The Ingenium 2.0-litre diesel engine possesses a lower and upper timing chain, which will be covered in more detail in the next issue. Pictured is the assembled lower timing gear, comprising (viewed anti-clockwise from the bottom), crankshaft sprocket, guide rail, fuel pump, idler double sprocket and the tensioner's plastic rail.

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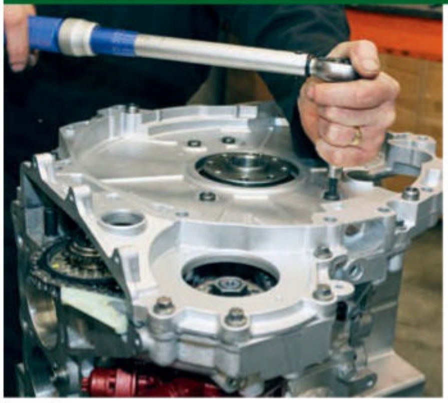
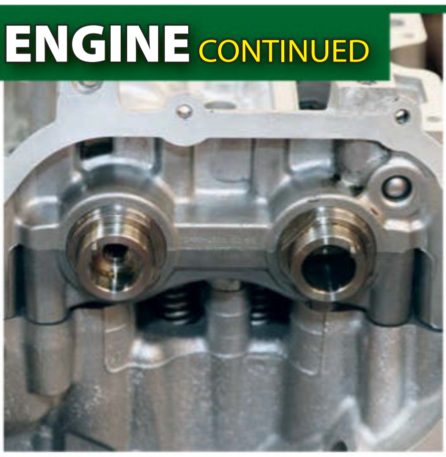
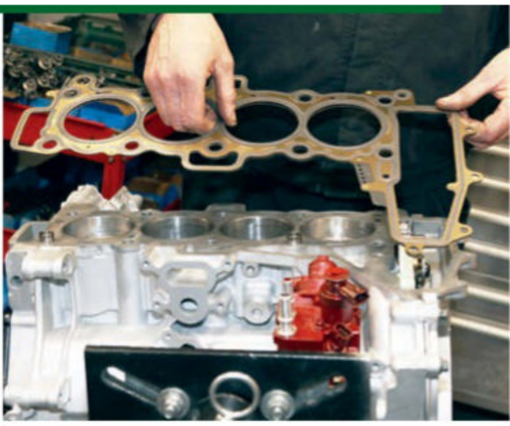
AJ200D INGENIUM ENGINE CONTINUED



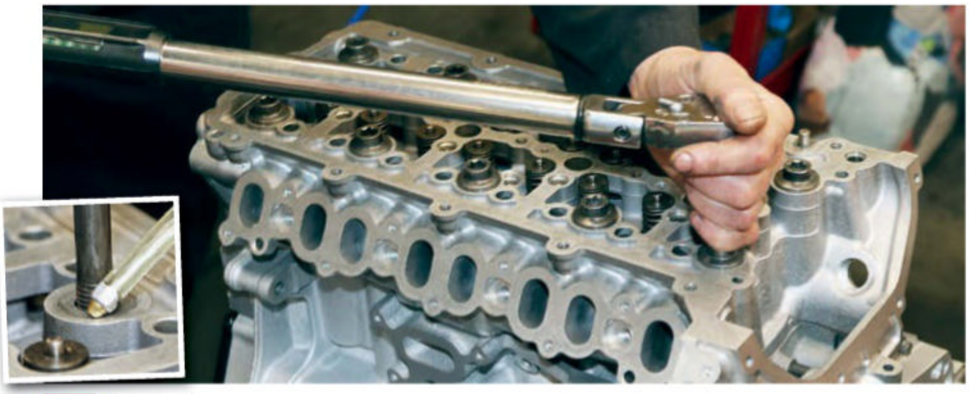
45 With the lower timing gear assembled, the lower cover can be refitted. We shall feature this procedure in greater depth next month, including renewing the crankshaft oil seal, which requires a dedicated installation tool.



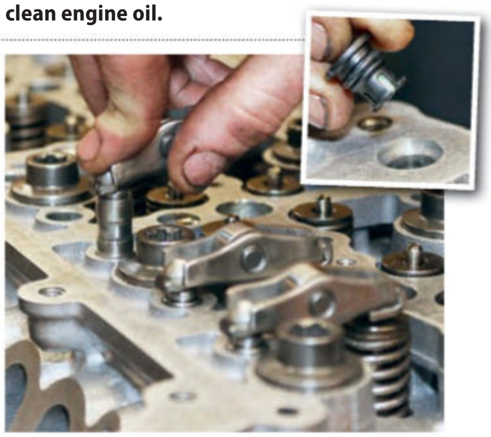
46 The cylinder-head upper section comprises the camshaft carrier but the lower half must be bolted to the engine block, first. Note that each camshaft possesses dowels, on which the sprockets locate. Should they be damaged, or missing, it could prejudice accurate timing.



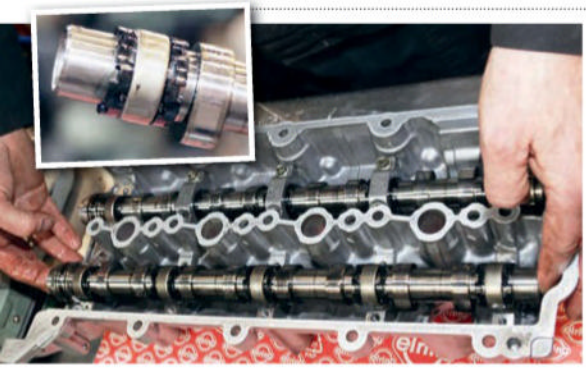
47 Both the block and cylinder-head facings must be level and clean. A new cylinder-head gasket is located on the block, first. The head securing bolts are inserted, after their threads have been lubricated with clean engine oil.



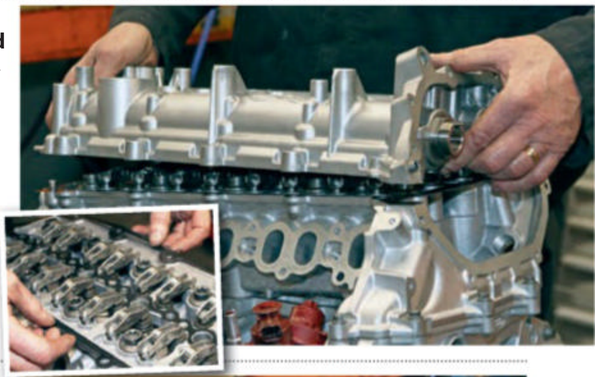
48 A drop of oil beneath the integral bolt washers prevents creaking, as they are torqued. The cylinder-head bolt torquing procedure is far from simple. On this engine, they need to be tightened to 20Nm in the usual criss-cross order, then to 53Nm. The bolts are then slacked by 180° before being tightened to 53Nm, then 90°, followed by a final 120° – again, all in a prescribed order.



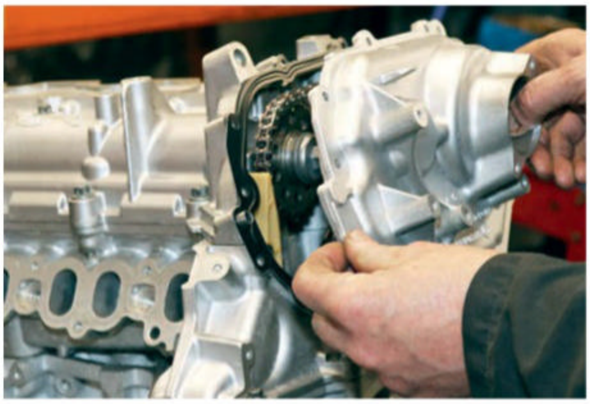
49 The valve tips are lubricated with engine oil, before the camshaft followers are installed and oiled. Should the timing chain(s) fail, these followers tend to break. A new crankcase release valve is installed within the cylinder-head, afterwards.



50 ◀ While the camshafts in the upper half of the cylinder-head are retained by conventional carriers, they are unusual in that they feature five roller bearings but only the two end ones can be renewed.



51 ▶ A gasket is placed between the two cylinder-head halves, before the upper half (including the camshafts) is lowered onto it. They are secured by eleven short bolts, tightened to 25Nm, and five longer bolts, which require 15Nm, plus 15°.



52 ◀ The upper timing chain is then installed, comprising a pair of sprockets, two chain guides and another tensioner. Details about the timing procedure will be featured next month. Note the separate gasket that is fitted before the cover is installed.

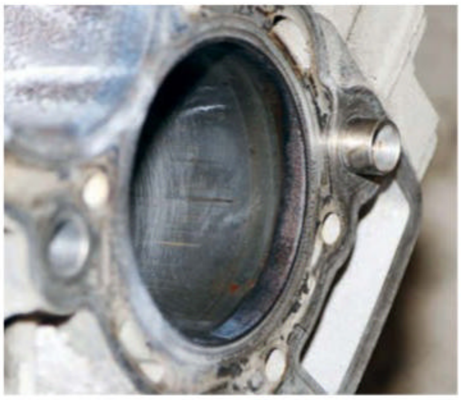
53 ▶ The remanufactured engine is now complete. NWS Motor Services supplies these engines on an exchange basis, with a 12 months' warranty.

ROB'S TOP TIP

JLR considers any out-of-warranty claims on a case-by-case basis.

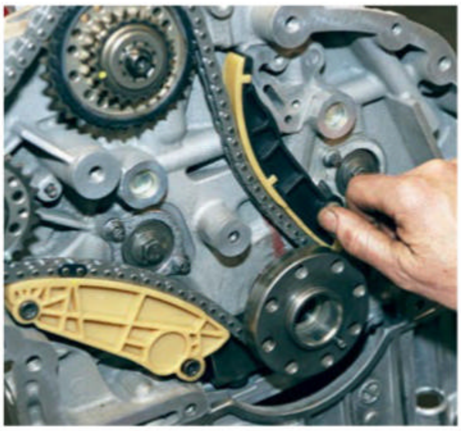
How does the Ingenium engine fail?

▶ NWS Motor Services highlights that most issues surrounding the 2.0-litre diesel are the consequences of the lubrication system failing early in the engine's life. Therefore, by the time the car comes out of warranty, most damage has occurred. NWS reports that it has not yet seen a 2.0-litre Ingenium unit that has passed 120,000 miles without needing substantial work. The following overview highlights the engine damage that can occur as a result of degraded oil and the factors that cause the lubricant to deteriorate prematurely.



A ◀ While the engine block is robust, a lack of adequate lubrication scores the bores. It is thought that excessive back pressure forces the top ring apart, adding to the problem. The resultant compression loss can encourage extra DPF regenerations, or a blockage, which deteriorates the oil further, causing accelerated consequential damage within the engine.

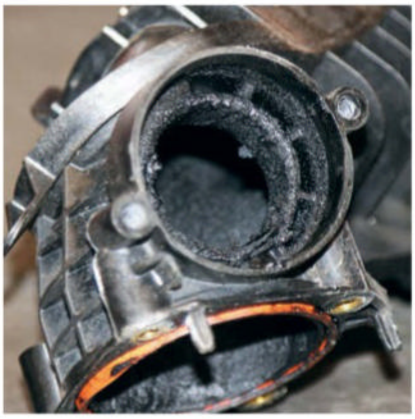
B ▶ Failure of the timing chains is a common issue. While deteriorated engine oil has its part to play, we understand that JLR supplied upgraded parts from 2019. We shall examine this issue in greater depth next month.



C Excessive DPF regenerations can contaminate the oil with fuel to such an extent that it cannot protect the engine's internals adequately. Consider that a blocked DPF tends to be a symptom of another issue, such as a faulty fuel injector, and so these underlying problems must be addressed, first. However, some specialists report that the DPF, on some transverse models, such as the Evoque and Discovery Sport, is too far from the engine to achieve temperatures high enough to regenerate.

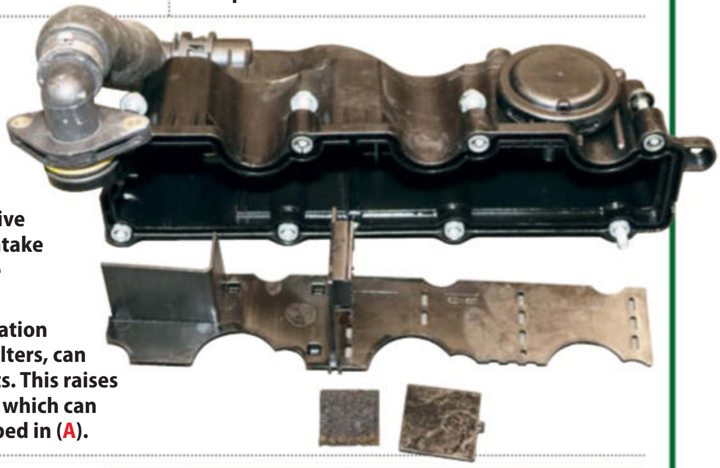
JAGUAR LAND ROVER

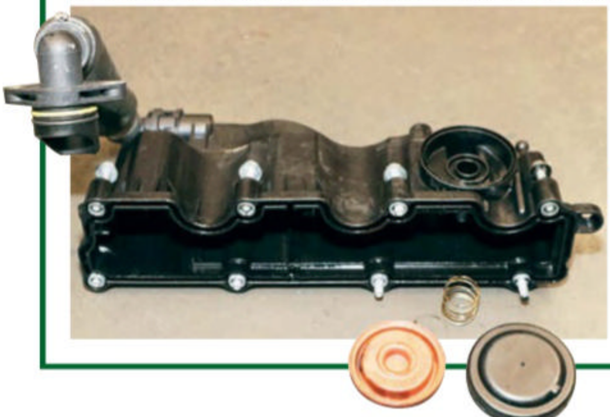
D As with most engines, an early sign of a lubrication problem is turbocharger failure. This is not because the unit is of poor quality – no turbo can survive for long with compromised lubrication.



E ◀ As with virtually every direct-injection diesel engine, a combination of crankcase ventilation and high-pressure EGR causes the intake manifold to clog with deposits. The reduction in intake air can cause excessive DPF soot loadings. Routine intake cleansing, therefore, is a wise preventative plan.

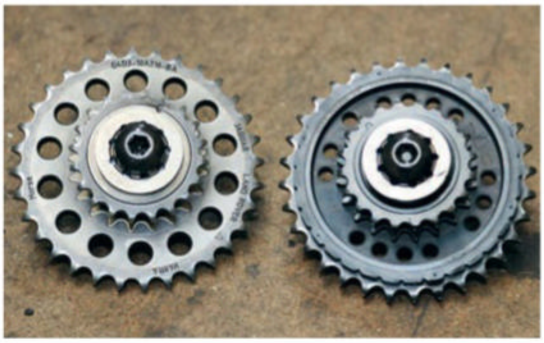
F ▶ The crankcase ventilation system, including the filters, can become blocked with deposits. This raises crankcase internal pressures, which can increase bore wear, as described in (**A**).





G ◀ The PCV valve can also clog, which also raises crankcase pressures. Fortunately, the filters can be cleaned and the PCV replaced.

H ▶ Aside from their bearings, balance shaft sprockets can fail, too. The timing chain idler sprocket can also fail, as we shall cover in the August issue.



CM Insider

Martyn Knowles brings you news and product reviews from the automotive industry

Survey reveals one in eight have suffered car crime in past three years

▶ Car crime is hitting Britain hard, with one in eight (12%) motorists saying they have fallen victim to car crime in the past three years, according to new research from **The Green Insurer**. Of those drivers affected by car crime, the most common incident cited was someone hitting their car and not leaving details – 30% said that had happened to them. Around a fifth (21%) had suffered break-ins and malicious damage, such as keying of the paintwork, while 14% said their car had been stolen from their home.

The study reveals that the financial impact of car crime is significant, resulting in on average £2300 worth of damage or loss per incident. Despite the high cost of vehicle crime to motorists' pockets more than a third (36%) of respondents say that they didn't recover any costs for the damage from their car insurance provider – this may reflect concerns drivers have about making claims for criminal damage on their insurance for fear that it will result in them seeing a hike in their renewal premiums.

15% believe that car crime has risen sharply in their area over the past three years. In London, concerns are heightened, with one in three (33%) saying they believe car crime has surged in this time period. A further 26% of Brits believe car crime has increased slightly, while a half of respondents believe that car crime levels are unchanged. Just 10% think car crime in their area has decreased.

Fall in quoted car insurance premiums could be slowing down

▶ Falls in quoted car insurance premiums could be slowing down despite dropping 10.8% in the past year, according to the latest Consumer Intelligence Car Insurance Price Index. It shows quoted premiums rose slightly month on month in April but still fell by 1.3% in the past three months.

Drivers in Wales saw the biggest fall in the past year at 21.1% and six other regions – the South East, North East, South West, Eastern, West Midlands, Yorkshire & The Humber – recorded double digit drops. But London saw quoted premiums rise 2% in the past three months and drop by just 0.2% over the past 12 months.

Drivers most commonly received a quote between £250 and £499 with 26% of quotes falling in this range and 23% between £500 and £749.

HELLA brakes now available to UK aftermarket

HELLA
BRAKE DISC

▶ HELLA has launched its range of premium brakes into the UK aftermarket, marking a significant expansion for the brand after more than a decade of braking success across Europe.

The braking lineup goes well beyond pads and discs, positioning HELLA as a true one-stop braking solution. It additionally includes calipers, drums and shoes, master and wheel cylinders, and wear indicators, and is complemented by HELLA electronics such as brake-by-wire pedals and ABS sensors.

HELLA brake pads are engineered to OE standards, using over 200 friction material components. Constructed with powder-coated steel backplates and high-shear adhesive, they feature application-specific chamfers and noise grooves to ensure quiet, consistent braking. With over 40 test vehicles covering nearly 200,000 miles annually, HELLA's pads are engineered for safety, performance, and reliability. Visit HELLA at: **www.hella.com/techworld/uk/car-parts/brake-systems/**

Borg & Beck introduces first DCT clutch kit to growing portfolio

▶ Borg & Beck, First Line Ltd's globally respected clutch brand, is expanding its range with the launch of its first Dual Clutch Transmission (DCT) clutch kit.

The latest addition, HKDCT1000, caters to VAG applications with 7-speed, direct-shift gearboxes, with popular applications including Audi A1 Sportback 2018-, SEAT Ibiza V 2017-, Skoda Fabia III 2014-, and VW Polo VI 2017-.

The new part number, now available to order, marks the brand's first step into the DCT market. Borg & Beck has ensured that all necessary accessories for fitment are included in the kit.

Kelvin Olds, Product Director at First Line Ltd, said: "The introduction of our first DCT clutch kit reinforces our commitment to delivering innovative solutions that meet the evolving needs of the market. Modern transmissions demand precision-engineered components, and our expansion into DCT clutch kits ensures that workshops can rely on Borg & Beck for high-quality, OE-matching solutions."

BORG & BECK
PARTS

For more info about Borg & Beck's clutch range, visit **www.borgandbeck.com/Products#ClutchComponents**

News in Brief

New LIQUI MOLY motor oil for Stellantis models

▶ Top Tec 6320 5W-30 is primarily developed for Citroën, DS, Fiat, Jeep, Vauxhall, Peugeot and Toyota petrol and diesel vehicles fitted with PSA engines. **LIQUI MOLY's** latest motor oil is suitable for engine types that require a lubricant with the specification Stellantis FPW9.55535/03 or PSA B71 2290, PSA B71 2297 as well as ACEA C3 and API SP. With the new development, the lubricant specialist is responding in particular to the updated requirements of car manufacturers – in accordance with the latest standard for PSA engines, Stellantis FPW9.55535/03. The new motor oil is suitable for EB2 petrol engines and for DV5R, DW10F and DW12R diesel engines built from 2012 onwards. Many of these vehicles have a toothed belt that runs in oil. As a result, the engines are subject to a great deal of abrasion and wear.

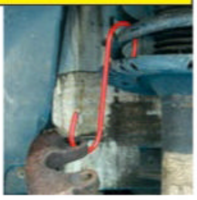
WAI unveils latest range expansion

▶ **WAI Europe** has expanded its range of starter motors and alternators with the introduction of 45 new references as part of its commitment to be 'first to market' with the best in market range, quality and availability at a competitive price. Notable references in WAI's new Alternators range include, part number 39016N-OE to fit Land Rover Discovery Sport 2.0D MHEV 2019-, reference 39018N-OE suitable for Hyundai i30 and Tucson, Kia Sportage 1.6D MHEV 2019-, part number 39014N-OE to cover Fiat 500, Panda 1.0 Hybrid 2020- and reference 21972N fitting Audi A3, SEAT Leon, Skoda Superb, Octavia, VW Caddy, Arteon, Golf 2.0D 2019-.

NEW FROM THE TOOL CONNECTION

Brake caliper hook set

£33.22 RRP
www.lasertools.co.uk/Product/9104



▶ Laser Tools has introduced their Brake Caliper Hook Set (part number **9104**), a six-piece, versatile solution for holding brake calipers, engine cables, coolant hoses, fuel lines, and electrical looms safely out of the way while carrying out servicing and repairs. Easily supports the weight of a brake caliper.

Hot glue dent repair

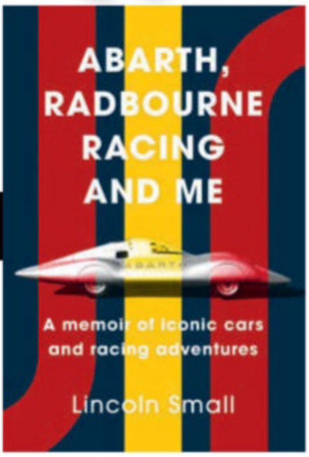
£165.60 RRP
power-tec.co.uk/Product/92727

▶ Power-TEC's new **92727** PDR Hot Glue Dent Pulling Kit combines the precision of hot-glue pulling with the force and accuracy of a slide hammer. At the heart is a 500mm carbon-steel slide hammer featuring a 1.3kg striking weight on a standard M12 × 1.75in thread.

ABARTH, RADBOURNE RACING AND ME

A Memoir of Iconic Cars and Racing Adventures

by **LINCOLN SMALL**
Written with **STEVE HOLE**


ABARTH, RADBOURNE RACING AND ME
A memoir of iconic cars and racing adventures
Lincoln Small

▶ Featuring rare, personal photographs and comprehensive appendices, *Abarth, Radbourne Racing and Me* is both a nostalgic celebration and a vital record of a team and a time when every lap was a leap into the unknown.

The 1960s was the golden age of European motorsport, with two countries leading the saloon car field: Britain with the Mini and Italy with the Fiats 500 and 600. As their rivalry was further ignited by the creation of the Mini Cooper and Fiat Abarth, there was a fervent need for tuning and 'go faster' component companies – and here, one of Britain's most iconic, Radbourne Racing, was born. As the co-founder of Radbourne Racing, Lincoln Small's passion for motor racing and his ability to connect with legends of the sport have defined his career. In this captivating memoir, he shares the untold story of how a small team, fuelled by ingenuity and their partnership with Fiat and Abarth, left an indelible mark on British motorsport history.

From the drama of race days to the friendships forged in the paddock, in a retelling rich with anecdotes of both rivalries and triumphs, Small brings to life the glamour, grit and camaraderie of those unforgettable halcyon days.

You have the chance to **WIN** one *Abarth, Radbourne Racing and Me* book. Just email me at **martyn.knowles@kelsey.co.uk** with '**Abarth Book**' in the subject line for a chance to win. You can include your contact details in the email, but it's not essential as I will email you back if you are the winner.

To buy the book, visit **Amazon.co.uk**

News in Brief

GSF boosts catalogue with lighting and mirror range from Trupart

▶ **GSF Car Parts** has announced it will launch a comprehensive range of mirrors and lights. The investment addresses the growing demand for high-quality, affordable parts for both passenger and light commercial vehicles. The range will be among the most competitively priced on the market, offering price-sensitive customers a cost-effective alternative without compromising on quality. Mirror units offer seamless, high-quality replacements with direct-fit compatibility and advanced features like BSW, puddle lamps, and heated glass. A 12-month or 12,000-mile warranty is included with every part. Speak to your local GSF branch to enquire about the Trupart range.

Kumho expands supply of tyres for Volkswagen Group

▶ **Kumho Tyre** announced that it is to supply original equipment (OE) tyres for the Volkswagen Tiguan. The primary model in the ECSTA lineup, the ECSTA PS71 SUV is a premium sports tyre designed specifically for high-speed driving. The Tiguan will be fitted with two sizes, 215/65 R17 and 235/55 R18. Kumho recently begun supplying OE tyres for the Volkswagen T7, the Passat and the ŠKODA Superb.

Clarke

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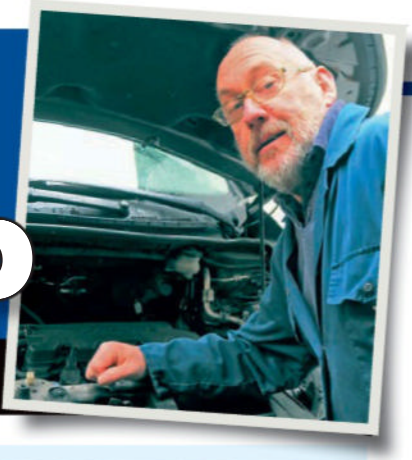
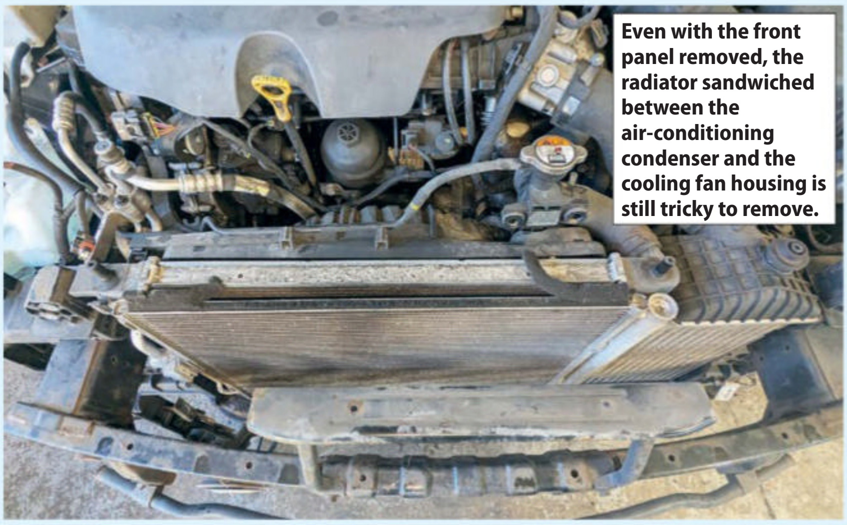
Tales from the workshop

Fixing advice from our garage proprietor **Steve Rothwell**



HYUNDAI i30

Cooling problems



Even with the front panel removed, the radiator sandwiched between the air-conditioning condenser and the cooling fan housing is still tricky to remove.

▶ I remember the days when removing a cooling system radiator was normally quite a simple job. The early Mini was one of the first to have a radiator tucked to the side which proved a challenge to remove, but the standard in-line configuration of most motors had the radiator at the front, making it easily accessible.

Now the radiator for the cooling system is placed at the front of the vehicle and normally has to share the space with an air-conditioning condenser, and the electric cooling fan system. The designers consider where they can fit the assembly, though do not give much consideration (as normal) to the needs of replacing the radiator during the service life of a vehicle.

The radiator on this 2013 Hyundai i30 1.6 diesel, had a small leak and needed renewing. The job time on this one is given as 1.8 hours, and with the limited access and the amount of stripping down needed, this is a tight time.

The radiator also includes an oil cooler, so as well as the mess of the draining coolant, there is the added mess of the dripping oil cooler pipes to deal with. Once the old radiator was out, and the escaping fluids cleaned up, the new radiator was fitted and the cooling system bled through.

HONDA CIVIC

Failed rad fan switch

▶ Noticing the temperature gauge was rising when sitting in traffic, the owner of this 1997 Honda Civic 1.5 petrol was relieved to see that it went back towards the normal mark when driving along at a steady 30mph. Now conscious of the problem, it was noted that whenever the Civic now sat in traffic the temperature gauge rose slightly, and not wanting any problem to develop, the Honda was booked in with me for investigation.

The reason for the unwanted temperature rise was soon discovered as the cooling fan was not cutting in when needed. Further checks showed that the remedy was going to be quite simple and was due to a radiator fan switch having failed and no longer signalling the cooling fan that it required operating.

The only sticking point may have been the removal of the switch, but this presented no problems and so the switch was renewed and the engine warmed up to test its operation. When the temperature rose this time, the fan cut in, lowering the coolant back to a permitted level.

The radiator fan switch was the source of the problem and fitting a new one was all that was needed to cure the problem and get the fan running when asked.

NISSAN QASHQAI

Heater plugs

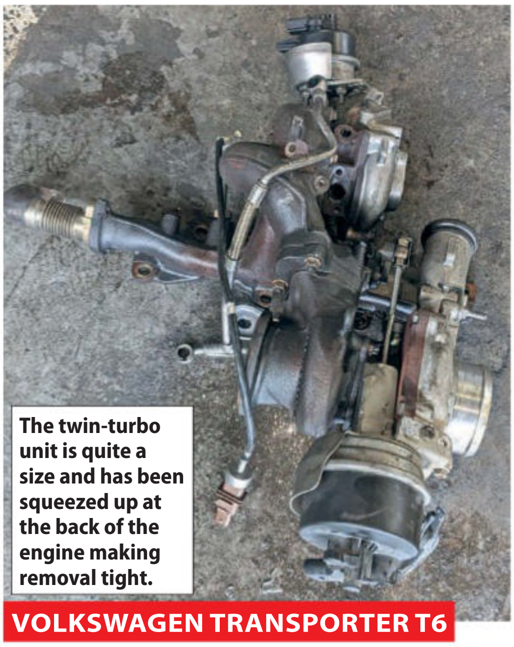
▶ I should start with a warning that not all glow plugs operate at 12 volts, and so the age-old method of testing the glow plugs by simply removing the glow plug and testing on the battery is not now recommended. There are a wide number of glow plugs now, that operate at around 4 volts and also have a pressure sensor built in.

Simply connecting this type up to the battery will cause damage and will ruin a possibly fully operating glow plug.

The glow plugs on this 2013 Nissan Qashqai 1.5 dCi, did operate at 12 volts and so could be tested in the old-fashioned way. After reports of poor starting, I had tested them first using the ohm meter and confirmed that only one of the four was giving the recommended reading of 2 Ω.

The owner decided that it would best to replace all four of the plugs. With the old plugs removed, I did find that only one was reaching a cherry red glow in operation.

Because these heater plugs operate at 12 volts, they can be checked by putting battery voltage onto the terminal when they are removed.



The twin-turbo unit is quite a size and has been squeezed up at the back of the engine making removal tight.

VOLKSWAGEN TRANSPORTER T6

Bi-turbo trouble at under 100,000 miles

▶ The turbocharger has become a standard fitment on a wide range of engines, allowing a smaller engine to deliver a greater torque and efficiency. Provided the engine oil is replaced when specified, they are now quite reliable, and turbo failure is not a common occurrence.

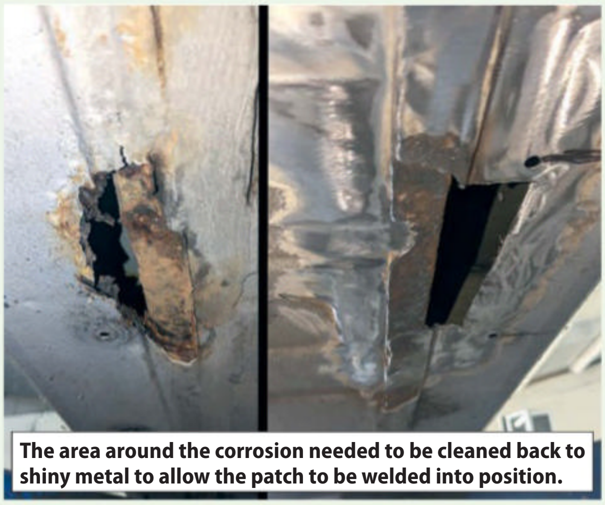
When they do fail, the result can often be quite dramatic with engine oil being pumped into the exhaust resulting in clouds of grey smoke filling the path of the vehicle.

When the turbo failed on this 2018 VW Transporter T6, it did simply lock-up and dramatically reduced the power, saving the mess of the oil spewing out through the exhaust system. The downside, though, was that this VW had a bi-turbo setup. This is not only a bigger lump to remove and refit but of course more expensive.

At under 100,000 miles, the owner of the Transporter was not too pleased that the turbo had failed but I did point out that he had owned the VW for over a year and had not had it serviced in his 18,000 miles of ownership. Possibly this was related to the failure.

BMW 3-SERIES

Bitten by the rust bug



The area around the corrosion needed to be cleaned back to shiny metal to allow the patch to be welded into position.

▶ I can certainly confirm that corrosion is not such a problem as it was twenty or so years ago, when I can remember the need to send several vehicles to the scrapyard, due to the extensive corrosion.

I do still come across the problem of corroded panels but not to the extent that I did all those years ago. The corrosion I do now see is normally around the sills, or the outer floor panels in the area of the sill panels.

This 2003 BMW 330i had just been flagged up on the MOT for “Offside outer seat belt anchorage prescribed area strength or continuity significantly reduced sill (7.1.1 (a) (i))”

This was due to the corrosion in the sill panel, which was in the prescribed area and within 30cm of the seat belt anchorage point.

The type of corrosion is one of the common failure points, and the remedy is to grind the panel back to good metal and then weld a panel in place. As is normally the case, the area of rust is normally larger than it first looks and once ground back the hole appears much bigger than the first impression.

Once repaired and sealed up though, this BMW was good for another few years yet.

Follow Steve on X: www.twitter.com/cmtips

SUBARU IMPREZA

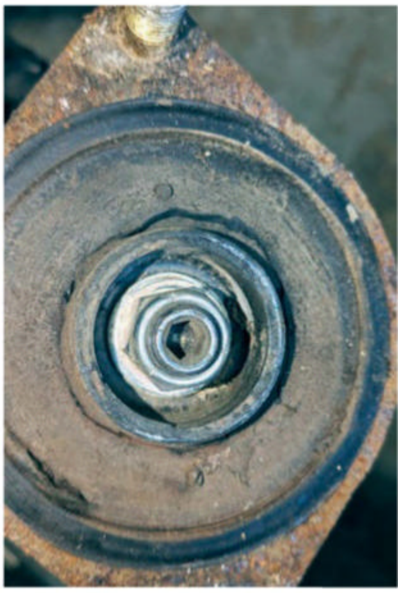
Perished strut top

▶ This 2004 Subaru Impreza 2.0 Turbo WRX, had quite a firm ride, but the owner had become aware of a knock and a creak that had slowly developed on the nearside rear when navigating the potholes and speed humps in the local town.

Asking me to look, I gave the back of the Scooby a quick bounce and could feel that the suspension was not quite as it should be.

Further investigation revealed that the strut was sticking and when stripping down it was also seen that the strut top had perished and was splitting. A new strut top and strut were required to get the suspension back up to standard, but unfortunately in this case the owner was only interested in having the one side done.

They were of the opinion that having noticed this fault, if anything untoward was to occur on the other side they would notice that and get it delt with when needed.



The rubber of the strut top had clearly perished and had begun to split, replacement was needed.

PEUGEOT PARTNER

Leaking oil

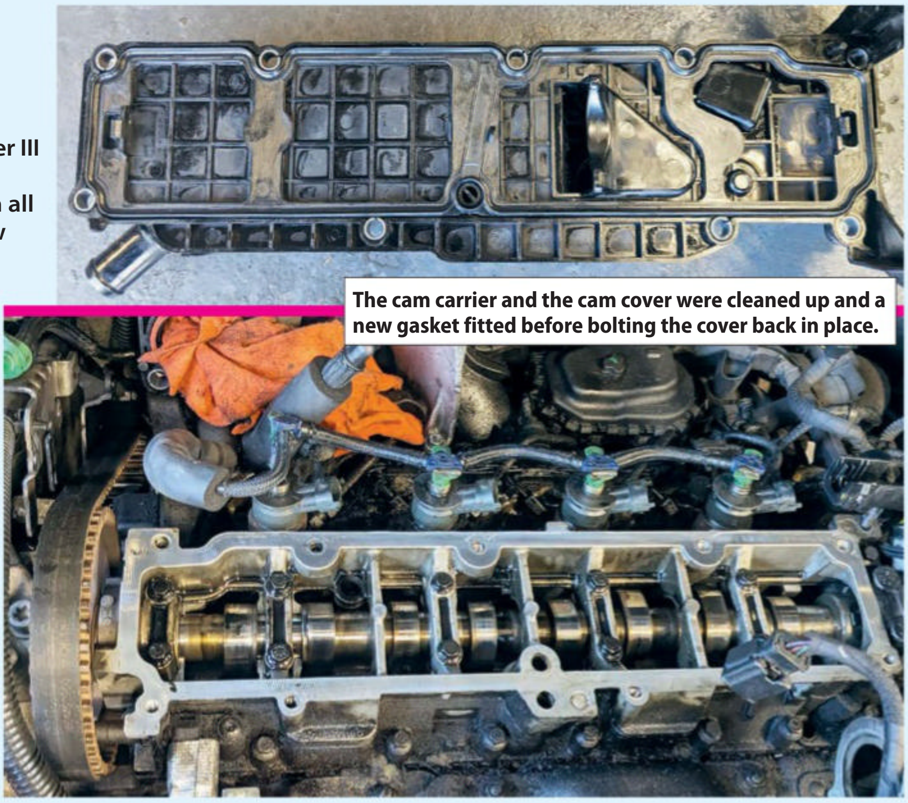
The engine on this 2016 Peugeot Partner III 1.6 Blue HDi was covered in a film of oily mess. The oil appeared to be oozing from all around the engine and the mess was now building up to such an extent that it was creeping onto the exhaust manifold and burning off resulting in an unpleasant smell for the driver and any passengers.

It was decided by the owner that perhaps it was time to stem the flow and get the oil leak sorted out.

The first job was to clean off the excess oil from the engine and have a look to see where the leak was originating from. This was not too difficult, and the leak was soon spotted as originating from the seal between the top of the cam cover and the cam carrier.

This is quite a simple fix and once the cam cover is removed, the neoprene gasket can be peeled off. The cover was then thoroughly cleaned before fitting the new gasket and then tightening down first to 5Nm and then to 12Nm.

Once boxed up, the engine oil level was checked before sending the Peugeot out leak-free.



The cam carrier and the cam cover were cleaned up and a new gasket fitted before bolting the cover back in place.

FORD F1

Custom petrol tank

It is nice to work on a wide range of motors and occasionally see a few non-run-of-the-mill varieties. When I worked on police vehicles many years ago it was the variety of the undercover motors that balanced out the monotony of the strict service regime that was applied to the rest of the fleet.

This Ford F1 is a good example, it was imported into the UK from the USA in 2009 and the original build date is around the 1950s. The vehicle has of course been modified from its original build and sports a bright red paint job now.

The problem the owner of this custom motor was suffering from was a smell of petrol in the interior. This was not difficult to diagnose as the fuel tank is fitted inside the cab and just behind the seats.

Thankfully by the time the motor reached me, the owner had located and purchased a replacement tank, and the only task that was asked of me was to fit the new tank in place and dispose of the old corroded one.

Out with the old and in with the new, curing the problem of the fuel smell in the cab.

MERCEDES-BENZ SPRINTER

Stuttering starter

Having now been let down by the starter, the owner of this 2004 Mercedes Sprinter 2.2 208D kept telling himself that he really needed to get the motor in for a new starter motor. The problem was, this was a busy time for him, and he was relying on a combination of parking on hills and leaving the engine running to prevent himself (and the Sprinter) getting stranded.

The time came though when he had to switch off on the flat and then discovered that the starter was giving just a click when attempting to power up the engine. He was now realising that this should have been fixed a while ago. Several attempts later, the engine did fire into life, and he decided that the best option would be to come straight to me and get this problem rectified before he really did get stranded.

The job only has a book time of one hour and with a starter quickly delivered by our local factors, the Mercedes was back on the road before the end of the day – and now the owner could drive around without fear of getting stranded.

The starter needed replacing and once the new unit was fitted, the Sprinter started up without problem at every attempt.

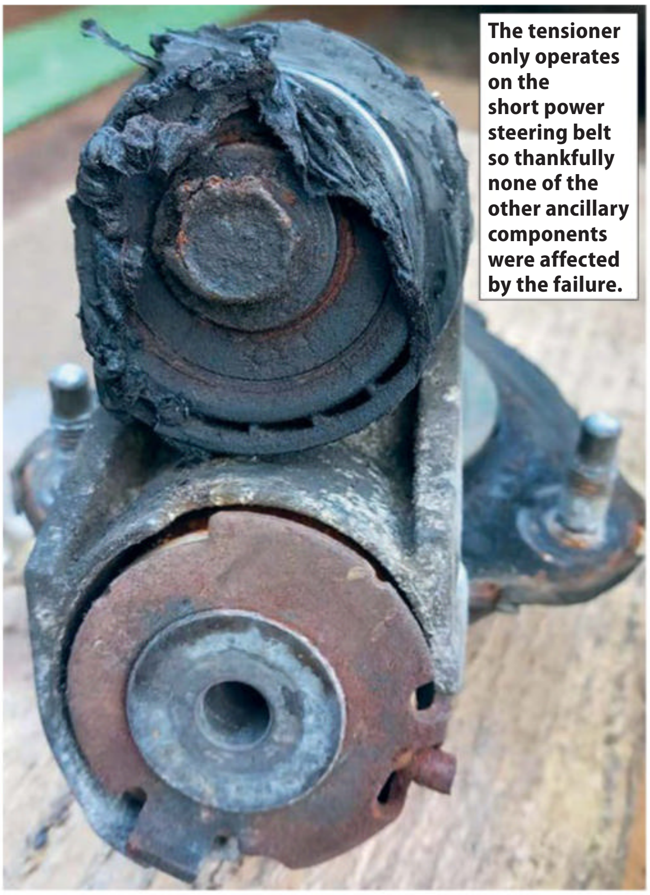
FORD MONDEO

Terrible tensioner

▶ The only symptoms the owner of this 2006 Ford Mondeo 2.0 diesel was aware of, was that the steering felt a little notchy. The symptom he was not aware of that was plainly obvious to everyone else, was that a screaming sound was being emitted from under the bonnet.

The owner was an octogenarian, and their sense of hearing had diminished quite dramatically. Opening the bonnet to have a quick look at where the noise was coming from, a distinct smell of burning rubber could also be detected. It didn't take the deduction powers of Sherlock Holmes to decide that the power steering drive belt was the source of the noise (and the smell). On this engine the power steering has the benefit of its own belt, and the rest of the ancillaries are powered by a second auxiliary drive belt.

The power steering belt and tensioner are not easily seen from above. But once stripped down and inspected, the tensioner was found to have a seized bearing and the belt was simply running over the melting plastic wheel. A new tensioner and belt cured the notchy steering and silenced the screech, although the owner was only aware that the steering was now smooth.



The tensioner only operates on the short power steering belt so thankfully none of the other ancillary components were affected by the failure.

CITROËN C4 GRAND PICASSO

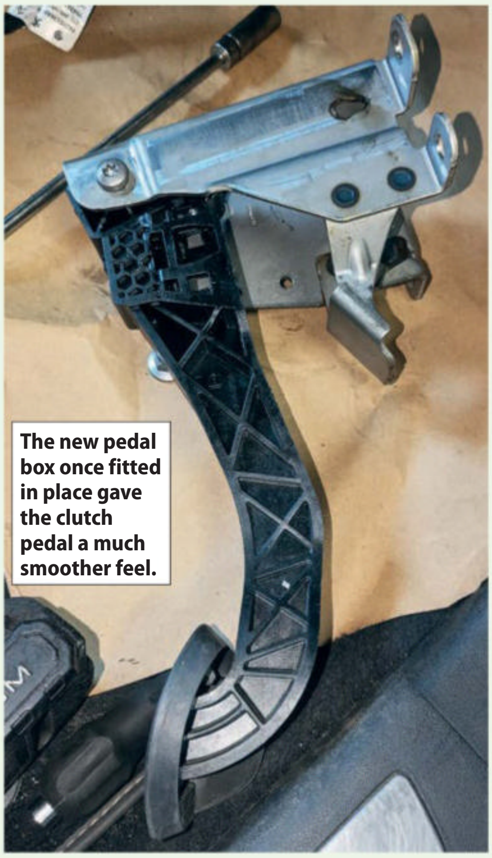
Pedal box change

▶ When the clutch felt strange on this 2015 Citroën C4, the owner had difficulty explaining exactly what was wrong, but they just knew that the clutch pedal did not feel the same as it had for the past three years that they had owned the motor.

When they turned up at my door with the Citroën, I jumped in to have a feel of the clutch pedal, fully expecting to be diagnosing the problem as a failing clutch or clutch hydraulics. This turned out not to be the case.

The pedal, as it was depressed, was veering off to one side and did have a distinct and strange feel to it. A look up under the footwell revealed the pedal box to have failed, allowing the whole mechanism to push to the side when under pressure.

I have seen several pedal boxes fail over the years and these are normally related to the brake pedal. The failure on this one was slightly different from the regular problems I see but a new pedal box resolved the situation and ensuring that the clutch hydraulics were all operating correctly I was happy that the problem was now fully rectified.



The new pedal box once fitted in place gave the clutch pedal a much smoother feel.

BMW 5-SERIES

Broken spring

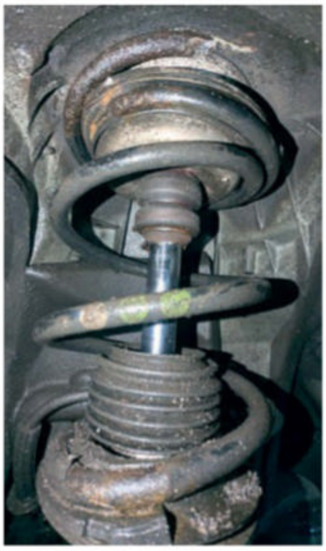
▶ The top coil of the road spring on this 2004 BMW 530i is like many now, a slightly smaller diameter than the main body of the spring. This has the effect that when the coil spring breaks, the main body of the spring can travel past the top mount and find itself resting on the top of the inner wing.

While this in itself is not too much of a drama, it does require the spring to be compressed before removing the strut, as otherwise the uncontained spring would simply make a break for freedom as the strut was removed.

This BMW spring is a large diameter and so this does make it easier to clamp, with plenty of coils to attach the spring clamps to.

Once off, the new spring can be fitted in place to the strut and the complete strut refitted to the vehicle without too much drama.

On this particular motor, the strut itself was showing signs of having failed and so the decision was made to replace both the strut and the road spring, completing two jobs in one go.



The spring pressure was pushing against the inner wing and not contained by the top mount – if released without clamping the spring, this could have allowed the strut to fly out once released.

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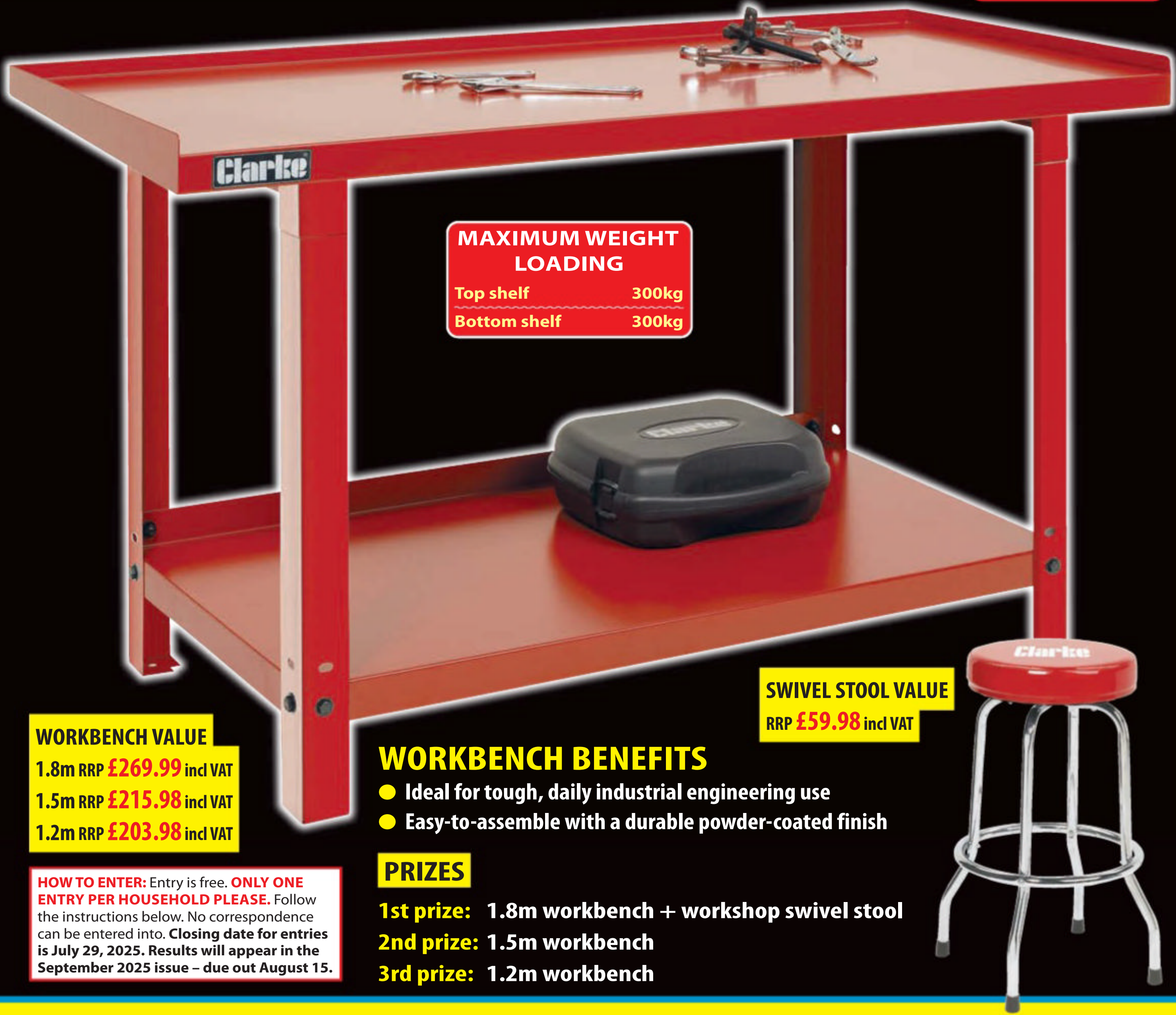

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CIG81212	3.6 x 3.6 x 2.5m	140613584	£239.98	£298.80	£287.98
CIG81015	4.5 x 3 x 2.4m	140613570	£276.00	£334.80	£331.20
CIG81216	4.9 x 3.7 x 2.5m	140613574	£315.00	£382.80	£378.00
CIG81020	6.1 x 3 x 2.4m	140613572	£345.00	£418.80	£414.00
CIG81220	6.1 x 3.7 x 2.5m	140613576	£385.00	£466.80	£462.00
CIG81224	7.3 x 3.7 x 2.5m	140613578	£479.00	£586.80	£574.80
CIG1432	9.7x4.3x3.65m	140613594	£1079.00	£1318.80	£1294.80
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3
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BALL BEARING

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2	CBB217C	7 Dr Cabinet	070118057	£279.00	£334.80
3	CTC1300C	13 Dr Combi	070113042	£189.98	£227.98

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JS4000
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JS1224LiN	6L	1200	010318905	£144.99	£173.99
JS4000	6L	2200	010311030	£164.99	£197.99
JS1224	6L	2000	010311224	£179.98	£215.98

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Model	Lifting Cap.	Order Code	exc.VAT	WAS exc.VAT	inc.VAT
CTJ1500QL	1.5T	020112633	£104.99	-	£125.99
CTJ1250AC	1.25T	020111818	£125.99	£155.98	£151.19
CTJ2500QLGB	2.5T	020112803	£159.98	£203.98	£191.98
CTJ1800AB	1.8T	020113202	£189.98	£233.99	£227.98

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Model	Motor	Tank	Order Code	exc.VAT	WAS inc.VAT	inc.VAT
8/260	2HP	24L	000119490	£104.99	£129.59	£125.99
11/550	2.5HP	50L	000119505	£159.98	£203.98	£191.98
16/550	3HP	50L	000119510	£229.98	£286.80	£275.98
16/1050	3HP	100L	000119515	£289.98	£358.80	£347.98

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PG2500A	230	2.2	5.6	010617850	£219.00	£262.80
PG3800A	230	3	5.6	010617852	£249.00	£298.80
PG3800ADV ‡	230/110	3	5.6	010617854	£269.00	£322.80
PG6500ADVES◆	230/110	5.5	9.7	010617856	£519.00	£622.80
PG9000ADVES●	230/110	5.5	16	010617860	£895.00	£1074.00

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IG1700F	1700W	22	010617095	£249.00	£298.80
IG1100	1050W	13.4	010611103	£279.00	£334.80
IG1900	2000W	20	010617117	£329.00	£394.80
IG2300	2200W	21	010612302	£389.00	£466.80
IG4000‡	3800W	57	010617130	£895.00	£1074.00
IG8000 ◆	7500W	129	010617135	£1699.00	£2038.80

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CTJ3000GB
CTJ2250LP

Model	Type	Tonne	Order Code	exc.VAT	inc.VAT
CTJ2250LP*	Low Profile	2.25	020113070	£49.98	£59.98
CTJ3000GB	Pro Garage	3	020113032	£109.98	£131.98
CTJ3000C	Pro Garage	3	020113037	£149.98	£179.98
CTJ2QLP ●	Low Quick Lift	2	020111820	£149.98	£179.98

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*CTJ2250LP has a 2.25 tonne capacity, has a low entry of only 80mm and includes 2 sockets

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IMIG100NG	40-100	010115610	£149.98	£179.98

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CDP5EB	350 / 5	060712030	£84.99	£113.99	£101.99
CDP5RB	350 / 5	060710035	£89.98	£113.99	£107.98
CDP102B	350 / 5	060715512	£109.98	-	£131.98
CDP152B	450 / 12	060715522	£179.00	-	£214.80
CDP452B	550 / 16	060715575	£289.00	£358.80	£346.80
CDP502F	1100 / 12	060715592	£675.00	£826.80	£810.00

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BC125	20/120	010310125	£89.98	£107.98
BC190	38/180	010310190	£104.99	£125.99
WBC180 ‡	35/180	010311500	£149.98	£179.98
WBC400 ◆	60/350	010311515	£199.98	£239.98
BC520P	50/510	010311082	£259.00	£310.80

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CON1150	1150W	060514015	£34.99	£41.99
CAG2350C	2350W	060512030	£64.99	£77.99

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DH10L	10L/day	010410687	£104.99	£125.99
DH20L	20L/day	010410683	£169.98	£203.98
DH30L‡	30L/day	010410685	£189.98	£227.98
IDH50L	50L/day	010410611	£469.00	£562.80

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Fully tested to proof load

*Folds for storage

- Rotates through 360°

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Model	Capacity	Order Code	exc.VAT	inc.VAT
CES340	340kg	020110124	£69.98	£83.98
CES450	450kg	020110121	£79.98	£95.98
CES560 ‡	560kg	020110123	£99.98	£119.98
CES680F*	680kg	020110122	£135.99	£163.19

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Tiger1800B	110/1595	3	050412202	£269.00	-	£322.80
Tiger3000B	200/2900	6.5	050412212	£379.00	£478.80	£454.80
PLS195B	180/2640	5.5	050411362	£479.00	-	£574.80
PLS220	230/3335	9	050410347	£639.00	£802.80	£766.80
PLS265B	225/3263	13	050411367	£698.00	£898.80	£837.60
PLS360	248/3600	13	050410375	£979.00	£1197.60	£1174.80
DLS360	248/3600	9	050410376	£1199.00	-	£1438.80

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● WAS £322.80 inc.VAT

Model	Tonnes	Order Code	exc.VAT	inc.VAT
CTJ2GLS ●	2	020111026	£264.99	£317.99
CTJ3GLS	3	020113085	£349.00	£418.80
CTJ5GLS	5	020113090	£469.00	£562.80
CTJ10GLS	10	020113095	£649.00	£778.80

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* Available with/without 7 pce pin, bracket & pressing plate kit
# Economy model
‡ WAS £454.80 inc.VAT

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Model	Order Code	exc.VAT	inc.VAT
CSA4B-4 tonne bench#	020413025	£169.98	£203.98
CSA10BB 10 tonne bench	020414020	£289.98	£347.98
CSA12F 12 tonne floor*#‡	020413020	£369.98	£443.98
CSA20FBT 20 tonne floor	020414058	£489.00	£586.80

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Model	Tank Volume	Flow Rate Req.	Order Code	exc.VAT	inc.VAT
IBC7	12/24V	7A	010317008	£39.98	£47.98
IBC15	12V	15A	010317010	£49.98	£59.98
IBC20	12/24V	20A	010317012	£62.99	£75.59
IBC25	12/24V	25A	010317013	£79.98	£95.98
IBC40	12/24V	40A	010317014	£99.98	£119.98

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CPSB100B	32 litre	6-25 cfm	000510133	£169.00	£202.80
CPSB200B	63 litre	6-25 cfm	000510134	£209.00	£250.80

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5 TONNES

- Tough cast iron base with screw in components
- High quality polished steel ram

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CBJ5B
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UK MADE

- Lift cars safely and quickly
- Tough angled steel construction

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CAT131
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BEST SELLER

PGF14
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WAS £32.39 inc.VAT

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PRO394	90	040218394	£109.98	£131.98
CHT862	235	040212862	£114.99	£137.99
CHT859	300	040213859	£197.00	£236.40
PRO396	222	040218396	£629.00	£754.80

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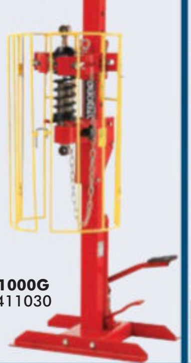

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150kg	800x300x1500	070710802	£39.98	£47.98
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SHHH24/150
000112440

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LOW NOISE LEVEL

Model	HP	CFM	Order Code	exc.VAT	inc.VAT
SHHH24/150	1.5	7	000112440	£139.98	£167.98
SHHH50/150	1.5	7	000112445	£179.98	£215.98
SHHH50/350	3.5	16.9	000112450	£269.00	£322.80

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CAR BEST BUY

CW2D **CW1D**

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Model	Tank Cap.	Type	Order Code	exc.VAT	inc.VAT
CW2D	10Ltrs	Bench	050810031	£59.98	£71.98
CW1D ‡	45Ltrs	Floor	050810030	£144.99	£167.98
CWM20	22.5Ltrs	Floor	050810020	£169.00	£209.99
CW40	75Ltrs	Floor	050810920	£219.00	£262.80

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180mm PAD DIA.

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- 6 stage variable speed control

WHEEL DOLLY (PAIR)

- 603x370x150mm

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JSM1000

‡ WHAT CAR BEST JUMP STARTER 2024

* AUTO EXPRESS CHOICE JUMP STARTER 2024

Model	Start Boost	Peak Boost	Order Code	exc.VAT	inc.VAT
JSM600	300A	600A	010319020	£49.98	£59.98
JSM1000*	500A	1000A	010319025	£59.98	£71.98
JSM1200‡	600A	1200A	010319030	£69.98	£83.98

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Project Mazda MX-5 Mk3

Battery, Belt & Bose

Part FOUR: Our NC model gets a new auxiliary drive belt, refurbished Bose amplifier and a few items to freshen up the interior. **Martyn Knowles** reports.

IN ASSOCIATION WITH BLUE PRINT

We were meant to be showing you alloy wheel refurbishment and fitment of new tyres this month, but I was away for a week in May and then the bodyshop who I'd like to use to make the alloys look beautiful said they were too busy to fit me in as they had two members of staff off. We will cover these jobs in part 5, clutch change in part 6 and rustproofing in part 7.

So, for this month we've covered a few small jobs that make our MX-5 more enjoyable to look at and drive.

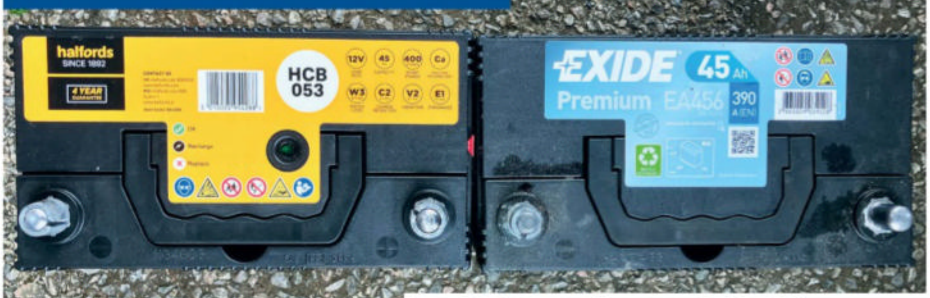
When servicing our MX-5 in the May 2025 issue, we mentioned that the 12V battery was the wrong size to fit into the battery tray – it needed a smaller battery. I happened to visit my local Halfords in late April, so thought to myself, why not buy a battery now. The HCB053 Halfords 4-year guarantee battery is £78.99 to customers, but with a Halfords Trade Card, the price went down to £58.79. Although I've just logged into my Halfords account online and the price with a Trade Card today is £63.19. To gain a Trade Card you need to work in the motor trade or automotive industry. Just ask your local branch manager for assistance to see if they will accept you for a discount card.

MX5parts.co.uk supplied us with a few OE parts after I put in an order for genuine floor mats (only two of course) with fixing clips, OE gear lever gaiter and an aftermarket chrome gear knob (images/details for the last two in a later part of the series).

Also, with a working Bose headset but no sound from the speakers – I found that the Bose amplifier might be the culprit. There are a few companies on eBay offering to repair these, so I removed our amplifier and sent it to a company near Edinburgh. Packaged well and posted on a Wednesday it was back with me the following Thursday.

Oh, and in the last issue, when we fitted new Bilstein shock absorbers, I mentioned the MX-5 was riding higher than before. We have since found the reason why... on the rear shocks we placed the shiny new spring cup upside down (on both sides)! Easily done – well we didn't do it on purpose. So, we will have to remove both rear struts again to correct ourselves. Hopefully all the nuts and bolts will come undone much easier this time!

NEW 12V BATTERY



1 As you can see, from overhead the fitted Exide battery looks identical to our new Halfords HCB053 unit. The Exide is 237mm in length, Halfords 238mm. Height: Exide 227, Halfords 225. Width: Exide 136, Halfords 129. The extra 7mm on the width was causing all our problems as it wouldn't fit into the battery tray properly. The reason for the extra width – there's a protruding ridge at the base of the Exide that other vehicles use to clamp the battery down. We have a different clamping setup, so this battery really isn't suitable for our MX-5. Hence the replacement. I have bought batteries in the past where this protruding edge is removable, but not on this Exide battery. The Halfords battery is reasonably priced with a 4-year guarantee. I have found in the past that Halfords batteries are reliable. I fitted one to my Audi A4 cabriolet, which sat still for over a year due to cabin water ingress. The engine was jump-started and the Halfords battery took a charge and continued to fire the engine unaided therefafter.

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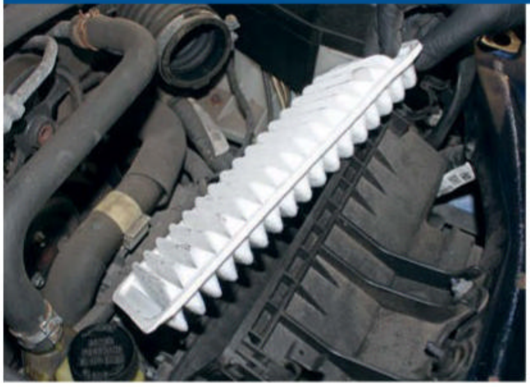
halfords
Grey
Primer

2 I'm not sure if I was bored or needed to get out for some fresh air, but when fitting the 12V Halfords battery I noticed the metal clamping bar was a little rusty. I found myself degreasing it with brake cleaner, rubbing it down with fine sandpaper, more degreasing, brushing on a rust remover gel, spraying with grey primer (two coats), and a topcoat of Fiat metallic black (two coats) I had in stock. After all that, I had to put the bar back in place before it was fully dry as the MX-5 needed to be moved. Plus, no one will ever see my efforts as it's hidden behind the battery cover. I enjoyed myself though!

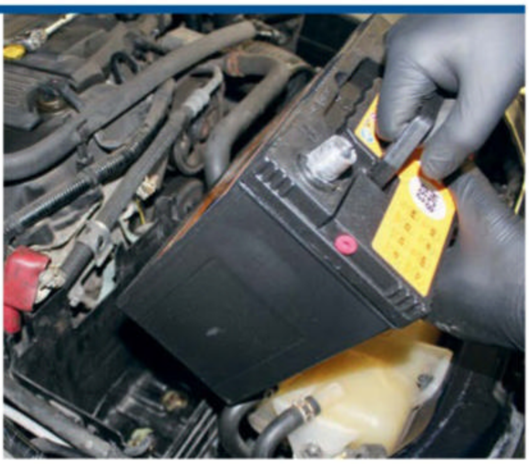
3 ◀ ▶ Before fitting the battery, I swept out the tray and sprayed each 10mm retaining bolt first with penetrating fluid, then white grease. I knew they were coming out soon, as one of the next jobs on the list was to renew the auxiliary drive belt. With the battery and its clamp fitted, the battery cover was located.

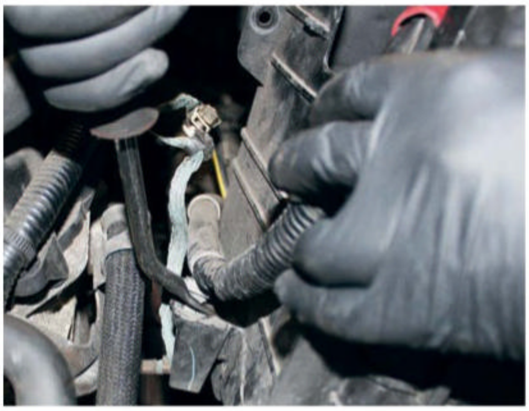
AUXILIARY DRIVE BELT SWAP



1 ◀ We need to clear the area in front of the engine to gain more access to the drive belt. First we detached the top of the air filter housing (two clips) and unscrewed it from its trunking, before placing on the workbench. The air filter was removed also.

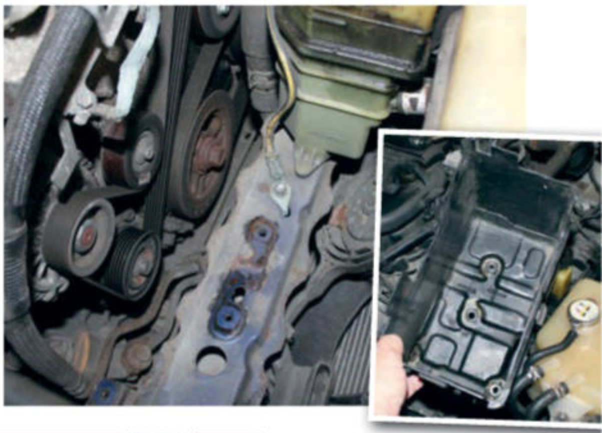
2 ▶ The 12V battery and its plastic tray need to be removed. First, off with the newly-painted battery clamp and battery terminals, before we can lift the battery free from its location.





3 ◀ The positive lead is held to the back of the battery tray and needs a small pry bar to help release it (in two locations). The negative cable also requires removing from here.

4 ▶ With the terminals clear, the four 10mm bolts are unwound and kept within the battery tray for safe keeping. The whole tray can now be lifted out of the way. This gave us the much needed space to tackle the auxiliary belt and pulleys.



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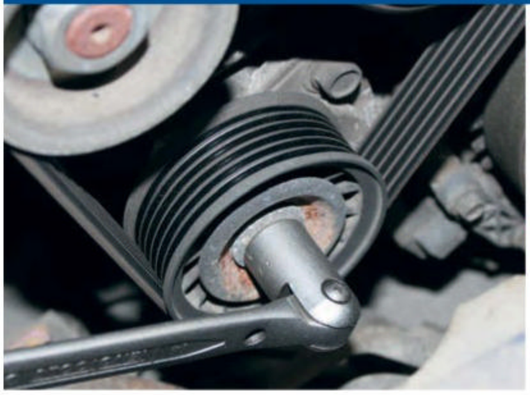
AUXILIARY DRIVE BELT SWAP CONTINUED



5 ◀ To get the old belt off, you need to release the tension by turning the tensioner (seen here) clockwise using a 14mm socket. With the tension held, you can slip off the belt.

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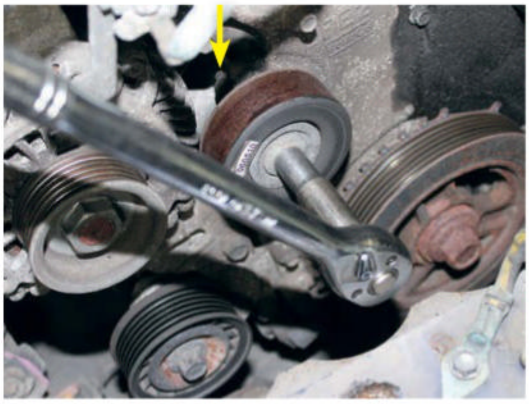
Auxilliary Belt
Keilrippenriemen
AD06R2250
Auxilliary Belt

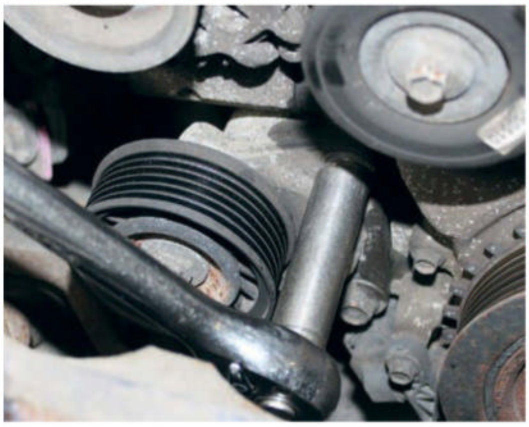
6 ▶ We ordered in a new belt, tensioner and idler pulley from Blue Print. Measure the new belt against the old, making sure they are the same length. We couldn't tell if the old belt was the original one.



7 ◀ We attempted to undo the 10mm idler pulley bolt with a small ratchet at first. It was tight. We then sprayed penetrating fluid over the bolt – the rear of it protrudes out of the back of the timing chain cover (arrowed).

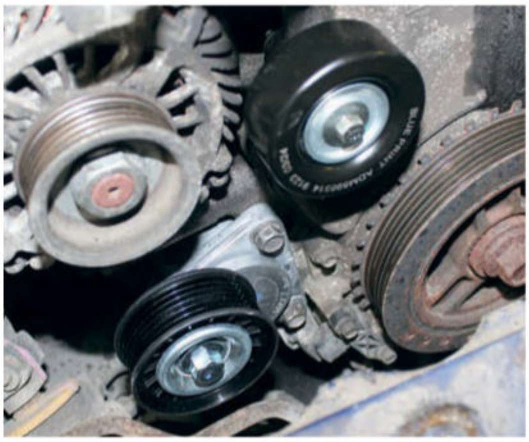
ADM596514
ADM596514 9123 03/24
BLUE PRINT

8 ▶ In the end we used a longer ratchet hoping that the bolt wouldn't break! With a crack it unfastened. It's a long bolt and the new Blue Print idler pulley comes complete with a new one.

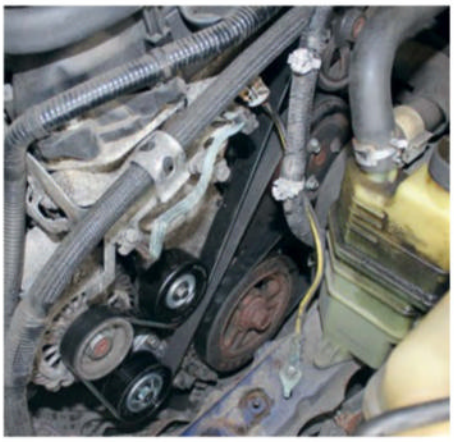


9 ◀ The belt tensioner is held on with two 12mm bolts. It's wise to renew this and the idler pulley when doing an aux belt change, as they will be worn at the mileage our engine has covered (102k). Blue Print p/n is ADM57650.

10 ▶ With the older tensioner off the engine, we spun the pulley by hand to see if it was rough. It wasn't, but it was a little noisy compared to the new part. We're unsure if this is the original 2010 Mazda part or if someone has changed the belt and tensioner before.



11 ◀ The shiny new tensioner and idler pulley in place. No torque settings could be found, so we added a smear of thread lock and hand tightened them. Now to fit the new belt.



12 ▶ Making a note of the belt run or taking a picture prior to removing the old belt might help you when fitting the new one. It looks straightforward, but somehow it's not. Un-tension the tensioner and feed the belt around the crankshaft pulley first. The belt runs around the water pump, the tensioner to the alternator, then the idler pulley, PAS pump, aircon compressor, then back to the crankshaft pulley. This 2.0-litre engine doesn't have a timing belt – a timing chain is fitted.

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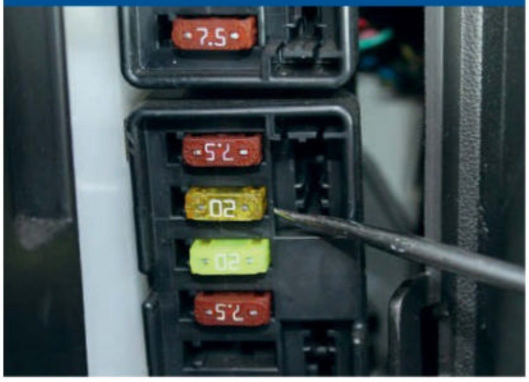
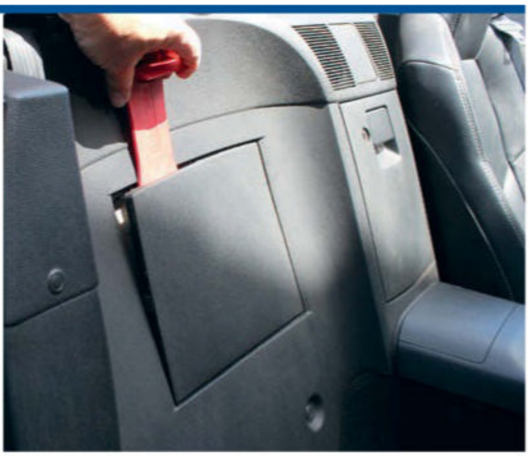
BOSE AMPLIFIER FIX

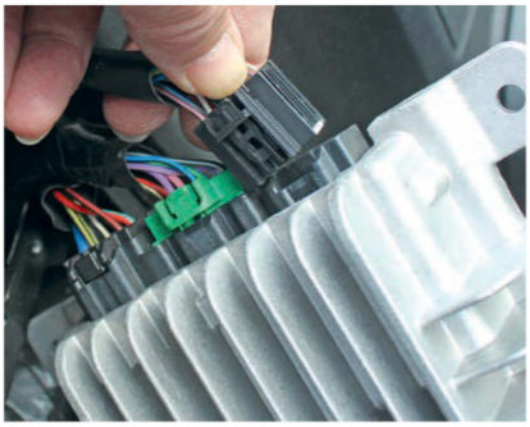

7.5
7.5
20
20
7.5

1 ◀ The Bose head unit worked, the radio worked, CDs played and the AUX input played music from my mobile phone. However, no sound emitted from the speakers. I found this 20A fuse for the audio system was missing. Why had someone taken it out? Pushing in a new fuse didn't make the system come to life, so it was time to find the amplifier.

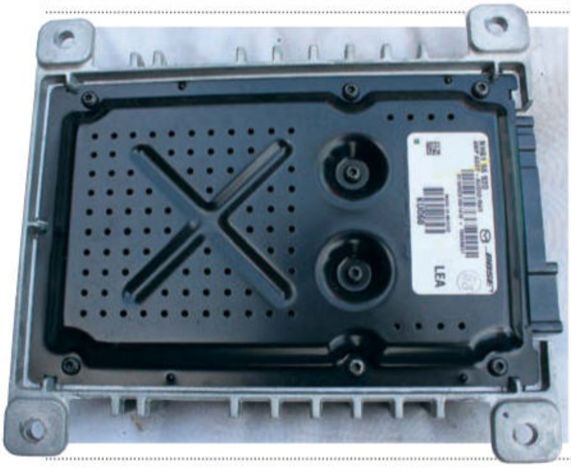


2 ▶ With the driver's seat pulled forward and the seat back tilted towards the dashboard, I was able to get into this panel. Here I found the amp.

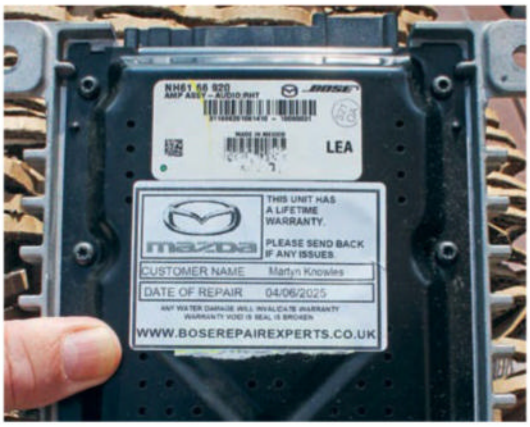
3 ◀ Reading MX-5 forums, I came to the conclusion that other owners have had Bose amp problems too. Recommendations suggested you can send the original unit away to be repaired. That sounded like a plan. Just four 10mm bolts hold it in.



4 ▶ With the amplifier free, there are three connectors at the rear to remove. The middle green one was harder to release but there's no chance of mixing up the connections when reinstalling, as they all have their place and are slightly different sizes.



5 ◀ The removed amp shows the original Bose part number. Hunting for a second-hand replacement using the part number is an option, however, the repair service gives a lifetime warranty.


NH61 66 920
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PLEASE SEND BACK IF ANY ISSUES.
CUSTOMER NAME Martyn Knowles
DATE OF REPAIR 04/06/2025
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6 ▶ The amp is light for posting, but it needs good packaging around it for the journey. www.boserepairexperts.co.uk returned our original unit within 8 days. The cost was £135, but for some reason unbeknown to me, they gave £20.25 discount. You must pay postage your end, but the price includes the return postage.

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SEEK · TRACK

7 ◀ Plugging the amplifier back in took about three minutes. First though, I removed that 20A fuse so there was no power going to the amp wires as I inserted them back into the unit. I believe from what I have read, that the Sport Tech MX-5s were fitted with Bluetooth connectivity. What that means exactly I've no idea, as there's no button on the system to connect to Bluetooth as far as I can see. Perhaps someone with more knowledge can explain how it works? As I see it, once you open the driver's door, the amp powers up. Possibly the Bose amp had an internal short and someone removed that 20A fuse due to the amp continuously taking power from the 12V battery. Anyway, with the 20A fuse reinserted, I can tell you that the speakers are now giving out full volume. Music to one's ears!

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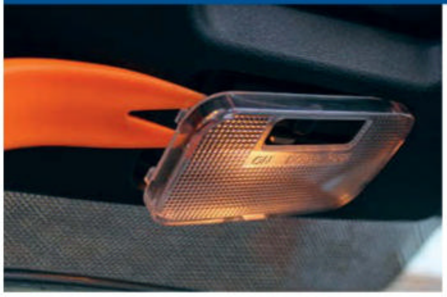
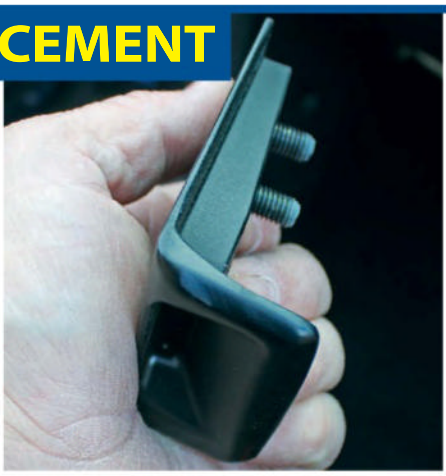
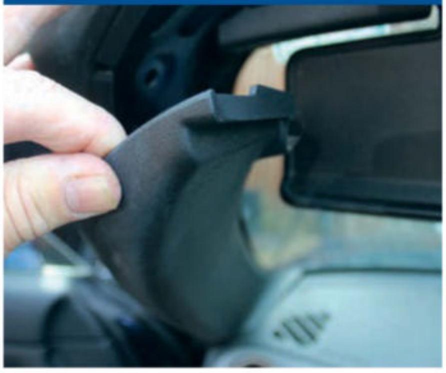
SUN VISOR REPLACEMENT



1 As mentioned in Part 1 of this series, the driver's sun visor dropped down when driving over big potholes and under hard braking. It obscured the road ahead. So I bought a second-hand replacement, which is the whole panel including the passenger sun visor. First the interior light lens is unclipped – however, I found later that this doesn't need to be disturbed.



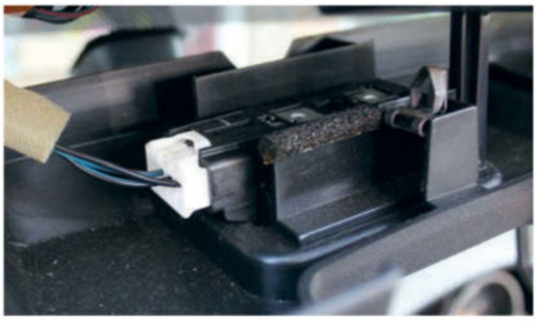
2 At each end of the sun visor unit, there's a bracket to remove. It locates the electric roof when it's closed. Two T40 bolts hold it in place. There's also two T30 bolts either side of the interior light to remove.

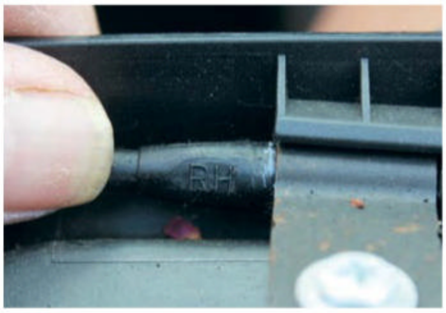


3 The A-pillar inner trim each side pops off from its plastic plugs. It doesn't need to come out completely, just the top part, so that the sun visor can drop down past it.

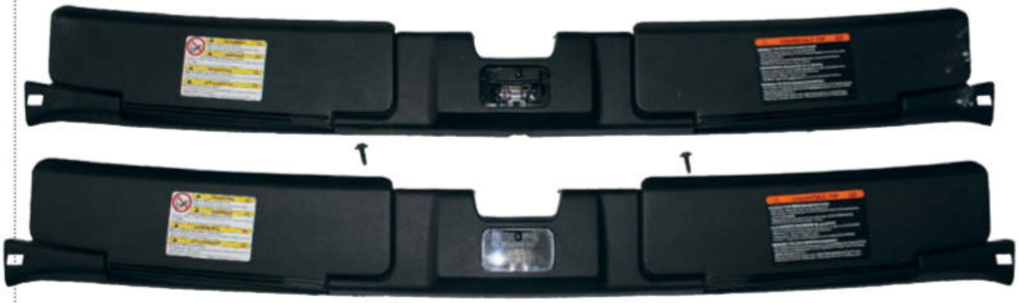
4 ◀ With the six bolts removed, the sun visor trim needs a hard tug to pull it away from the windscreen frame (close to the centre is best). It's held with eight clips.

5 ▶ Before the trim can be free, the interior light's electrical plug needs its tag pushed down while you pull it out. Now the sun visor unit can be moved out of the car.





6 You can remove the offending sun visor I'm told, to replace just that, but it's a fiddly job. Each sun visor is marked LH and RH.



7 Our used replacement sun visor unit (shown below our original) cost £44.99 from MX-5 breakers – PitStopSalvage (I found them on eBay). It's in excellent condition and comes with the light unit and bulb ready to fit. The sun visors (on both sides) work as Mazda intended.

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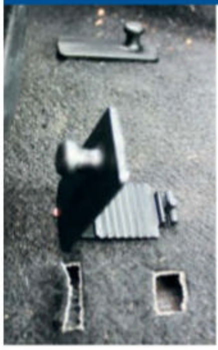

1 ◀▶ With no floor mats inside our car, I treated our NC model to some original Mazda mats. Not cheap at £57.77 including the fixing clips. MX5parts.co.uk offer these OE mats and some aftermarket cheaper alternatives. We needed the clips and as you can see they fit into holes in the carpet. The mats look superb.

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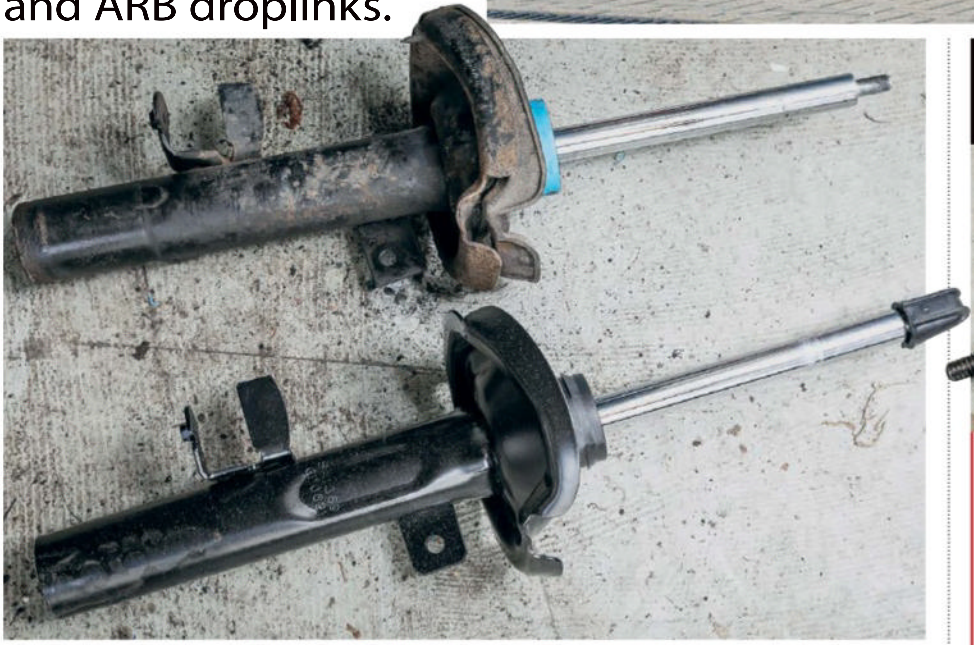
Focus Mk3

Part SIX: James Burr renews suspension struts, top mounts and ARB droplinks.



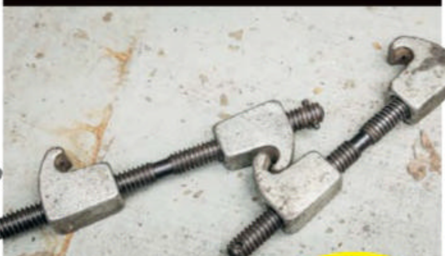
Like many European cars, all Mk3 Focus models are fitted with coil-over-damper-type MacPherson struts on the front. Along with independent multi-link suspension (incorporating separate dampers and springs) on the rear. The standard suspension components should last for 80-120,000-miles, but that's not always the case, and it does depend on how the car has been driven in its lifetime.

The most common problems that tend to occur on Mk3 models range from broken coil springs and worn top mounts to leaky shock absorbers. In all cases replacement parts will be required.

There are a range of symptoms associated with failing chassis parts, including adverse handling – excessive squatting on acceleration, nose diving when braking and excessive body roll when cornering – as the chassis geometry is allowed to move too far from optimum. This also can also cause premature or uneven tyre wear, excessive vibrations and various clunks and noises from the suspension and steering (broken springs for example, can usually be detected from a loud clunk in the steering).

While suspension removal isn't always the easiest task, it can be carried out effectively by the home mechanic. The following process can not only be used to solve problems involving specific components (like springs and top mounts) but can also be adapted when fitting aftermarket performance suspension, such as lowering springs or sports suspension kits. This process isn't solely for the 1.0-litre EcoBoost model, either. Although the actual components may differ a little (performance models like the ST and ST-D use uprated and lowered suspension as standard), by using the correct parts for each specific model and year, this method can be used on any Focus Mk3 hatchback. Estate models are extremely similar, the only significant difference is that they use a slightly different damper setup on the rear. This is noted in the step-by-step guide where applicable.

HELPFUL TOOLS



- **Coil spring compressors**
- **Chisel or suspension spreader**
- **Torque wrench**
- **13 and 18mm swan neck spanners**

TORQUE SETTINGS

FRONT

▶ Strut to carrier:	**80**Nm *plus* **180°**
▶ Top mount bolts:	**35**Nm
▶ ARB droplinks:	**48**Nm
▶ Piston nut:	**55**Nm

REAR

▶ Lower mounting bolt:	**115**Nm
▶ Upper mounting bolts:	**25**Nm
▶ Piston nut:	**25**Nm

APPROX COSTS

Front shocks	**£90** (pair)
Front springs	**£35** (pair)
Rear shocks	**£48** (pair)
Rear springs	**£35** (pair)
ARB droplinks	**£18**
Front top mounts	**£20** (each)
Rear top mounts	**£15** (each)

INSPECTION & DIAGNOSIS

Springs and Dampers:

▶ While visually diagnosing a broken spring is easy, leaky shocks on the Mk3 Focus is not always quite as straightforward. If there's no obvious signs of oil running down the damper body, the dust covers on the front can be prised up to take a closer look. However, this isn't possible on the rear. That said, when you push down the corners of your car they should be relatively stiff and return to position quickly. If they're overly bouncy (and you have noticed adverse effects when driving) in most cases you should trust your instincts.

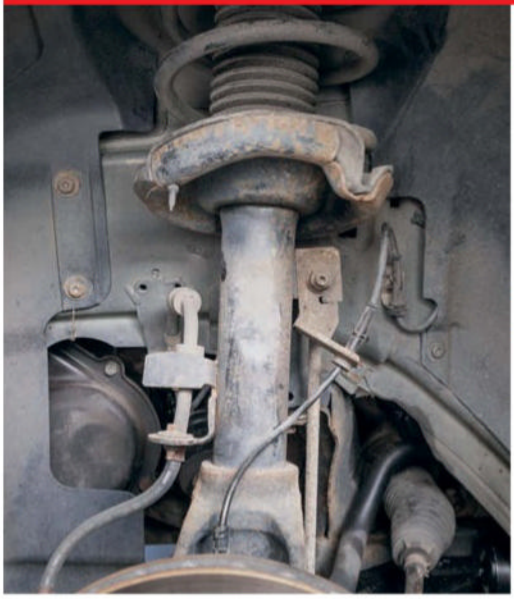
Top Mounts:

▶ As the name would suggest, your top mounts are the part that hold the top of your damper to the vehicle. With cars like the Focus (and most other European hatchbacks), which use a coil-over-damper setup at the front, they also hold the spring in compression. The springs and dampers on the rear are located separately. Note: Many other cars, particularly from Asia, use a similar Chapman strut on the rear, which is basically a coil-over-damper assembly that doesn't need to pivot with the steering.

Top mounts are important for both handling and wheel alignment and are designed to hold the piston rod in place via a vibration isolator. Just like other bushings this can perish and become slack over time. This will cause excessive movement in the suspension strut and a change in chassis geometry, along with premature tyre wear and excessive vibrations. The front top mounts also contain bearings which allow the mount to turn with the steering, these can also wear causing problems such as abnormal noises and poor steering return/self-centring. A bad top mount will also inevitably lead to accelerated wear of your shock absorbers, and a leaking damper will always increase the chance of wear on the top mount.

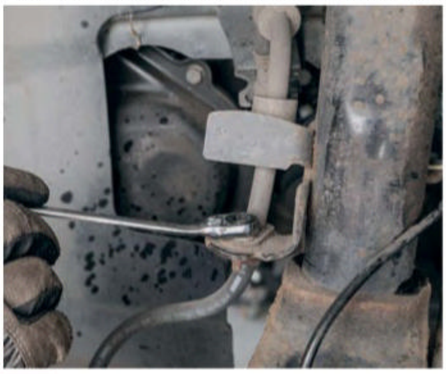
When inspecting (with the suspension still in the car) look for excess movement in the piston rod at the top when you wiggle the strut, along with any clunks, rattles or other abnormal noises. Top mounts should hold the suspension strut without excessive play. Front top mounts should also be checked by pivoting the steering from side to side – it should move smoothly without any graunching or grinding noises from the bearings. If upgrading your suspension for a performance kit, always think about upgrading, or at least replacing, your top mounts, too.

FRONT SUSPENSION STRUTS

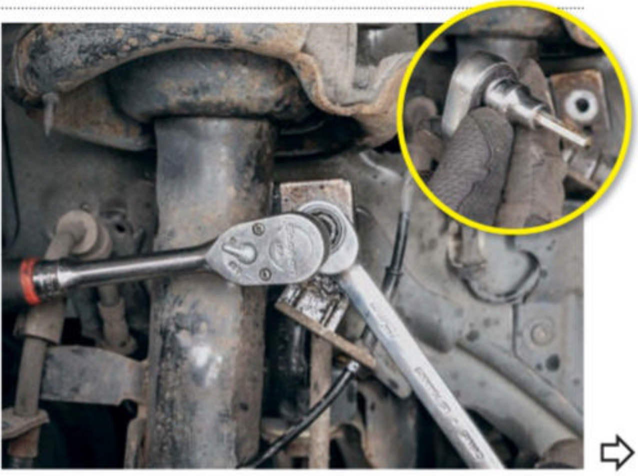


1 ◀ Jack up the car and secure on axle stands, locate the suspension leg and inspect for top mount movement, along with any other damage. This is worth carrying out before you begin removal, just in case you need order more parts. These can be replaced in Step 19, in our case the top mounts are in good condition and replacement is not required.

2 ▶ The suspension leg is mounted using three bolts at the top and a pinch bolt at the bottom where the strut is slid into a flange on the hub. In addition, the rubber brake pipe and anti-roll bar droplink are attached directly to the strut and require removal before the main mounting bolts. Before you begin, it is always worth soaking all bolts in penetrating spray and leaving for a few minutes.

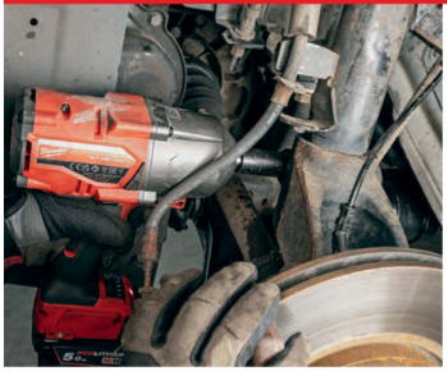


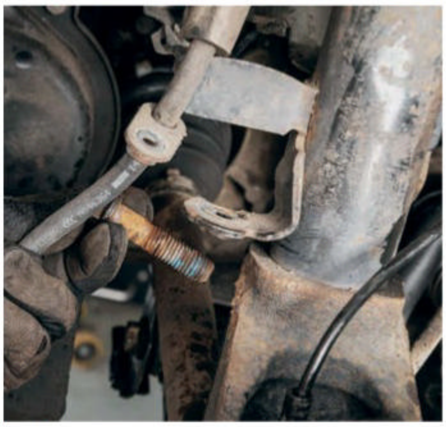
3 Remove the 8mm bolt connecting the brake pipe to the strut and tuck the pipe out of the way.



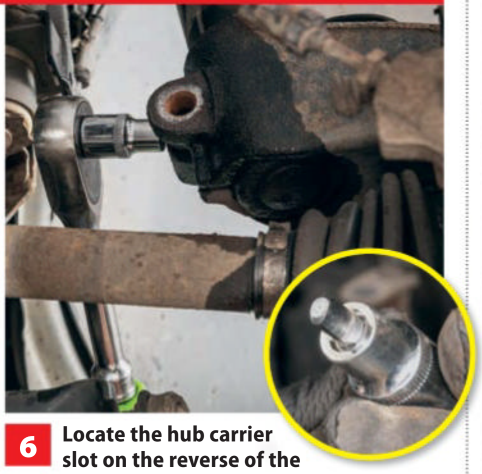
4 ▶ Now remove the anti-roll bar droplink. This should also be removed from the ARB at the bottom of the droplink if replacement is required. In our case, the standard Ford item is fitted and this requires a 15mm spanner, holding the centre of the balljoint thread in place with a 15mm Hex key. Note: Some aftermarket parts vary with the size of the tools used for fitting and removal. It is also common, particularly with corroded parts, for fittings to round off. In this case the only option is to cut off the droplink and replace.

FRONT SUSPENSION STRUTS CONTINUED

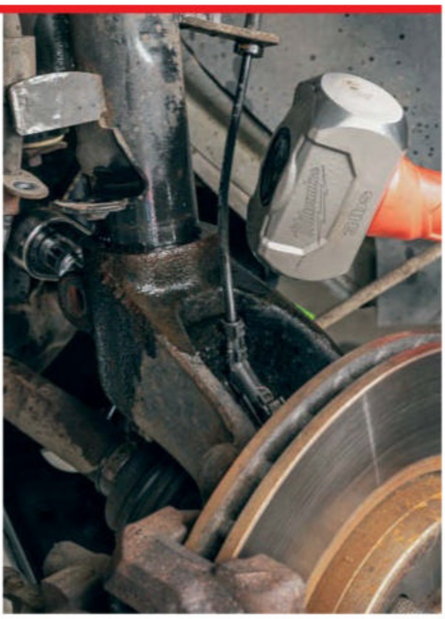




5 Remove the bottom pinch bolt using a 15mm socket, this will be tight. The flange on the Focus has a captive thread, so there's no need for any tools to hold the other side.



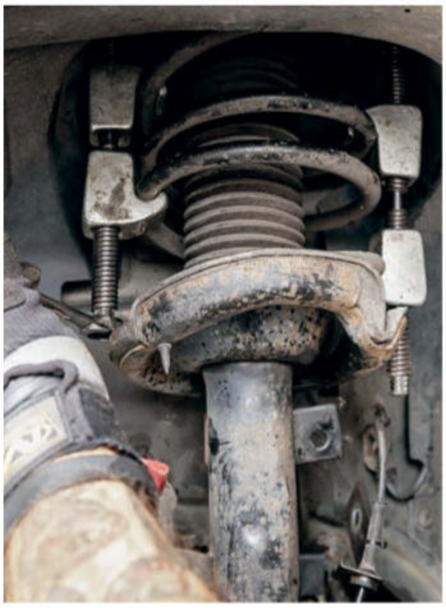
6 Locate the hub carrier slot on the reverse of the hub, spreading this a little using a chisel or pry bar helps you to free up the strut body. You can also use a special cammed spreader socket, these are available for less than £5 and work on all vehicles with this type of setup. Simply insert into the slot and twist.



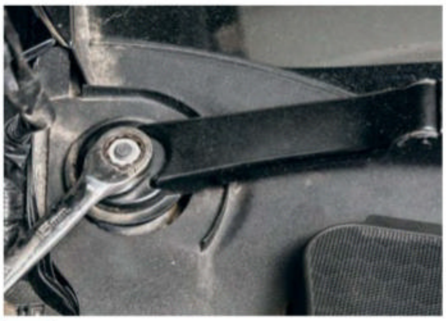
7 Now the hub can be tapped downwards to loosen the strut. Tap the hub down as far as you can.

LINK REPLACEMENT

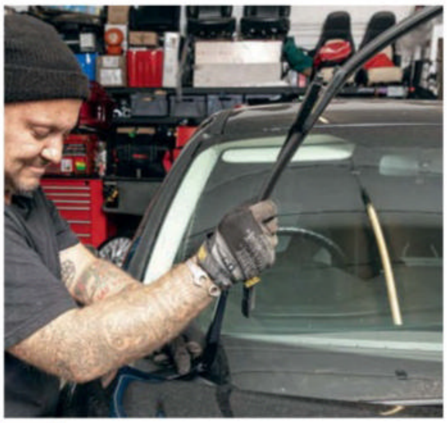
▶ While you don't have to replace droplinks it's always recommended because these wear out easily. In many cases droplinks will need replacing well before other suspension components. These join the anti-roll bar to the suspension struts on each side and always require inspection. The balljoints at each end should be stiff and offer plenty of resistance. If they're slack and moved easily, they will require replacement. In our case we're replacing as a matter of course.



8 As with many standard vehicles, the struts are difficult to remove because of the length and how far they pass into the flange. Here we recommend using your spring compressors to shorten the length of the strut slightly to aid removal at the bottom. Once the spring is compressed, the strut can be removed by a combination of tapping down the hub and pushing the shock absorber upwards (or when replacing shocks tapping up on the spring cup with your hammer). Once the strut is removed from the hub at the bottom, you can move to the top mountings.

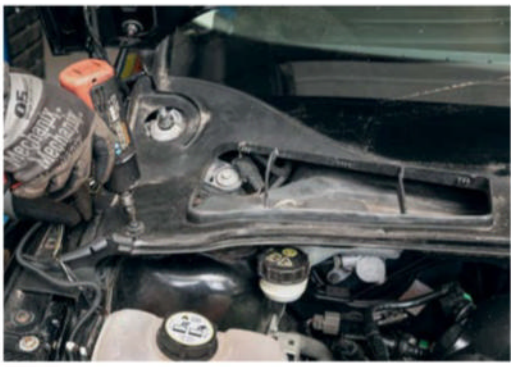


9 The top bolts are tucked away behind the plastic engine trim, this must be removed for access. First prise out the plastic bolt cover on each windscreen wiper arm using a screwdriver or pry bar, and remove the 15mm securing bolt.

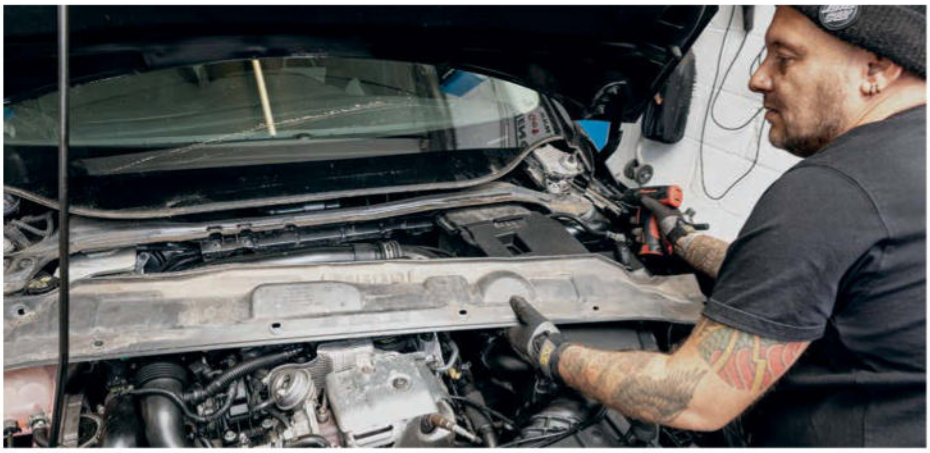


10 Close the bonnet and wiggle both wiper arms free.

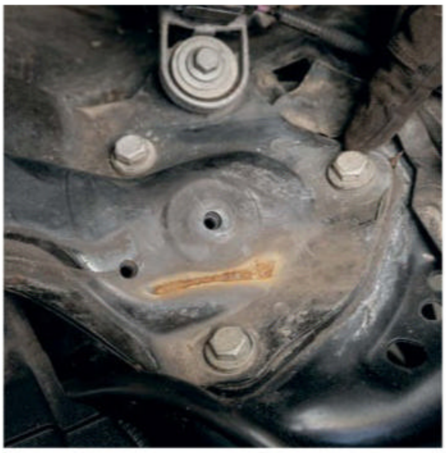
11 Remove the two plastic access panels and rubber sealing strip.



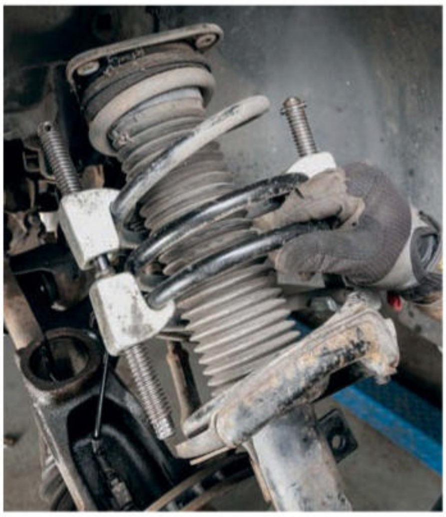
12 The top panel is removed with a T27 Torx socket. Remove the bolts at each end, and then prise out the clips all along the panel.



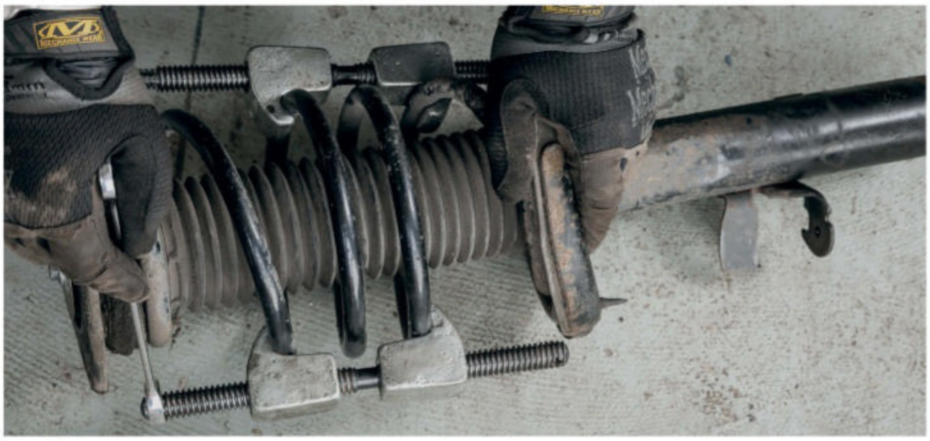
13 Once the plastic trim is removed, the metal panel underneath must be removed. This is secured by two 10mm bolts. Remove the bolts and pull the panel free.



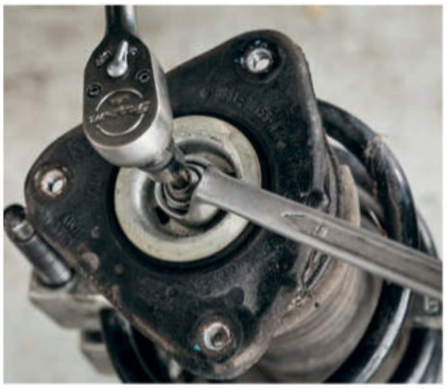
14 Now the strut top bolts can be accessed and removed using a 13mm socket.



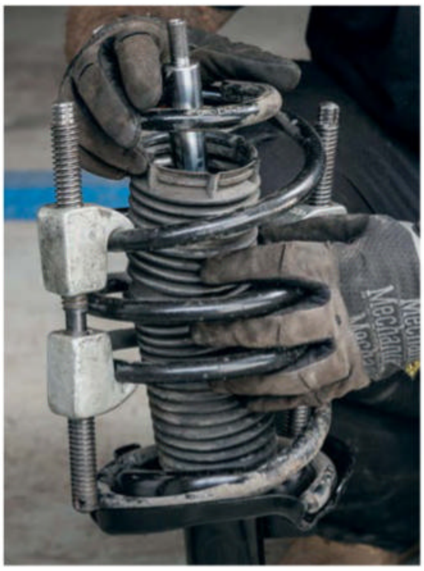
15 Hold the strut below as you remove the top bolts, and manoeuvre it out of the wheelarch.



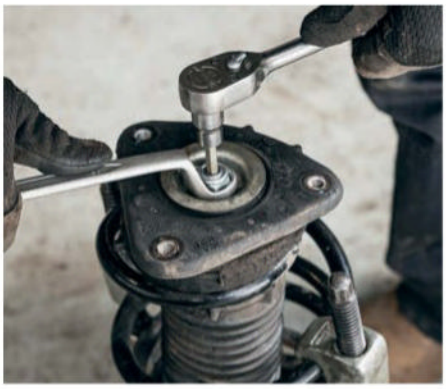
16 The strut requires stripping down to swap the top mount and spring. Before attempting this, remember that it is crucial that the spring is held in compression safely using your spring compressors. Never use any other method to remove top mounts. It may be necessary to reposition your spring compressors to ensure they are holding the spring securely. Note: This step is also necessary when fitting lowering springs and performance suspension kits that do not come pre-installed with a top mount.



17 ◀ Once the spring is secure – when fully compressed you should see that the top mount and spring are separated – the top nut can be removed using an 18mm swan neck (deep) spanner and a 5mm Hex key. Dismantle the strut by pulling off the top mount, spring, dust cover and rubber bottom gasket.



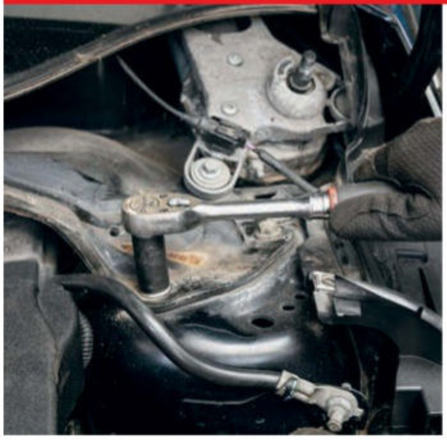
18 ▶ Double check that the brackets are orientated the same way on your new strut before building it up. Struts on the Focus, and many other vehicles, are 'handed' which means they are designed for a specific side. Make sure your new strut looks exactly the same. Transfer the parts onto your new strut in the reverse order as they were removed, ensuring that the spring locates in the bottom. Note: If installing lowering springs, spring compressors may not be necessary as these may be significantly shorter than standard springs.



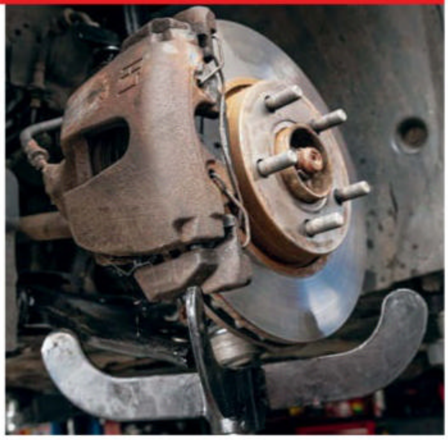
19 ◀ All suspension struts will come with a new top nut and this may not necessarily be the same size as the original, the original nut should not be reused. The same can be said for the Hex key needed to hold the piston rod, you may need a different size. Install the new top nut and tighten down. Never remove spring compressors until the top mount is secure. Note: Ford specify a torque of 55Nm for this nut but, in reality, it's unlikely that you have the specialist tools – such as pass-through torque wrench – suitable for the job. In this case make sure the nut is tightened down sufficiently to seat it (where it stops threading and tightens) and nip it up to hold the top mount in place securely. This nut does not have to be extremely tight.

⇨

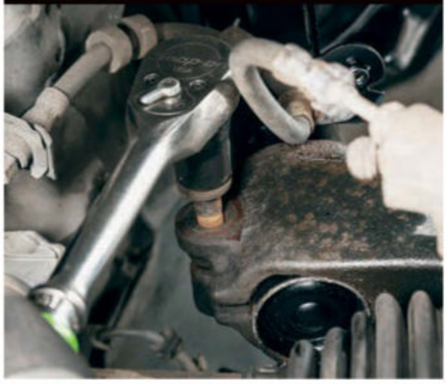
FRONT SUSPENSION STRUTS CONTINUED



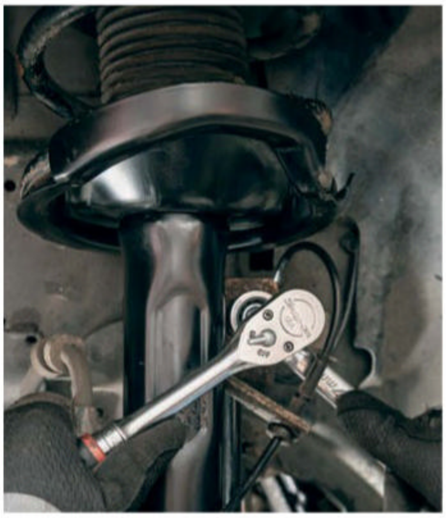
20 Twist the top mount and the strut to ensure that the bolt holes at the top line up and the brake/ARB droplink brackets are centred. Replace the three 13mm top bolts, seating them but not fully tightening. Use hand tools only.



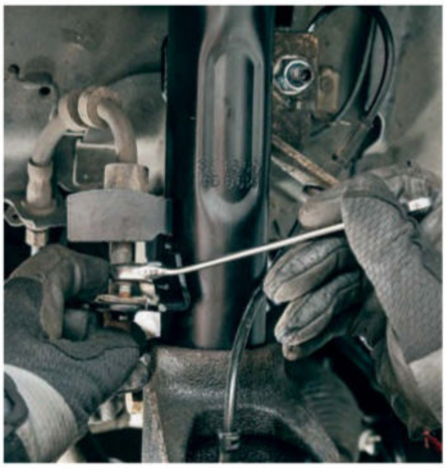
21 To locate the bottom of the strut into the flange use a jack under the hub to move it upwards, sliding the strut in position. A little lubricating spray on the strut helps here. Ensure that the strut is straight and located all the way in the flange. Standard and most aftermarket struts have a stopper to ensure it doesn't slide too far. Some struts also have a centre tab that must be located in the flange slot to make sure the strut is perfectly centred. If you've used them for better access the spring compressors can now be removed.



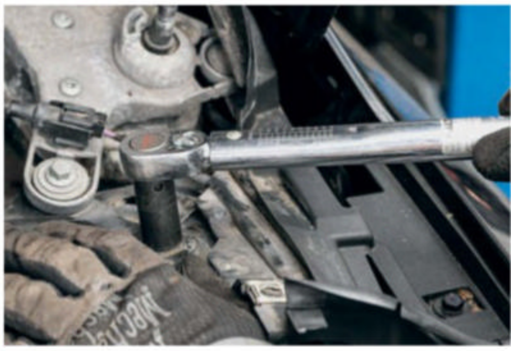
22 Replace the bottom pinch bolt and tighten until it seats.



23 Manoeuvre the ARB droplink into place – it may be necessary to adjust the supporting jack to get everything into the correct position. Once the thread is through the bracket, replace the nut and tighten until it's fully seated.



24 Refit the brake pipe bracket bolt with an 8mm spanner/socket.

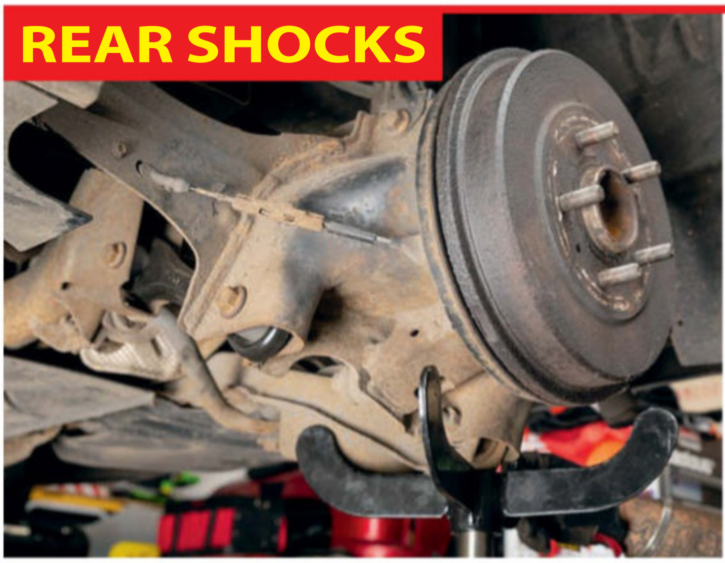


25 Finally torque all bolts to their specified settings. ARB nuts should be tightened to 48Nm, the bottom pinch bolt to 80Nm (and then a further half-a-turn) and the top mounting bolts to 35Nm. Note: Before replacing the under-bonnet trim, we recommend double-checking the upper bolt torque once the wheels are refitted and the car is on the floor.

WHEEL ALIGNMENT

▶ Once the suspension has been completed, it is always crucial to have the wheel alignment checked by a professional. Fitting new parts will usually change the chassis geometry. This is especially important if the wheel alignment has been adjusted at any point using the old parts as a basis.

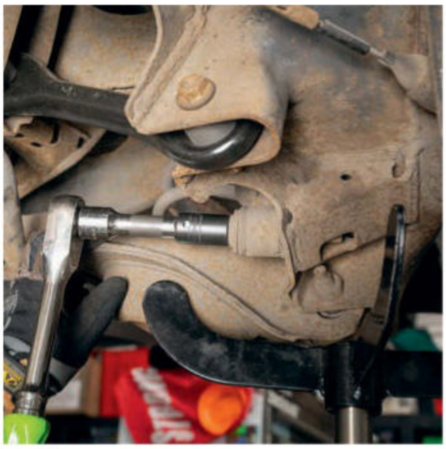
REAR SHOCKS



1 ◀ Located under the arches, the rear dampers are secured by one bolt at the bottom and two at the top. Before removal first use a jack to support the rear hub. This will prevent it dropping suddenly when the bottom bolt is removed.

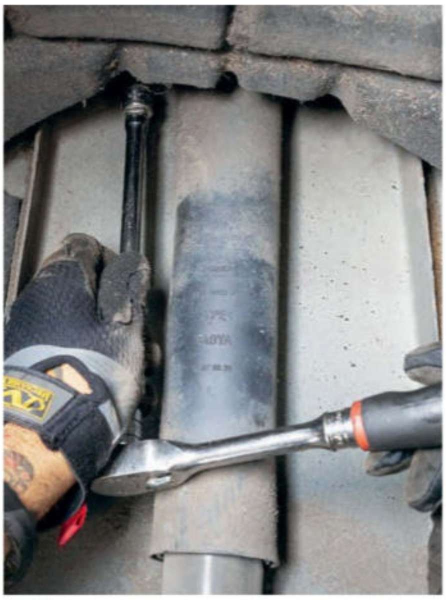
ESTATE MODEL?

▶ Focus estate models utilise a slightly different damper setup on the rear. This is mounted using a single bolt at each end. When removing a damper on an estate model (denoted in Step 2) first remove the top bolt, and then the bottom. Note: To gain access to the upper left-hand shock absorber upper mounting bolt, the exhaust must be removed from its mounting rubber and the heat shield removed. The rear shocks on the Focus estate come ready-to-fit and do not require top mounts, so you will not have to swap those over when refitting.

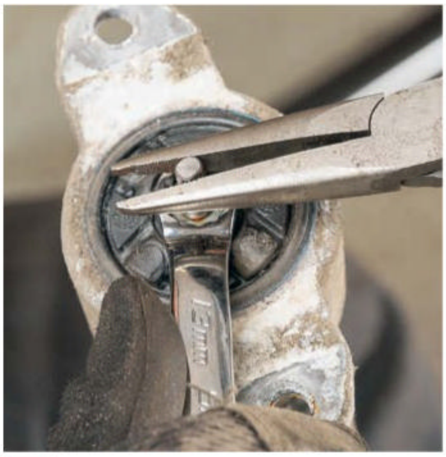


2 First remove the bottom securing bolt with a 15mm socket or spanner to free the bottom of the damper. This bolt passes into a captive thread in the hub.

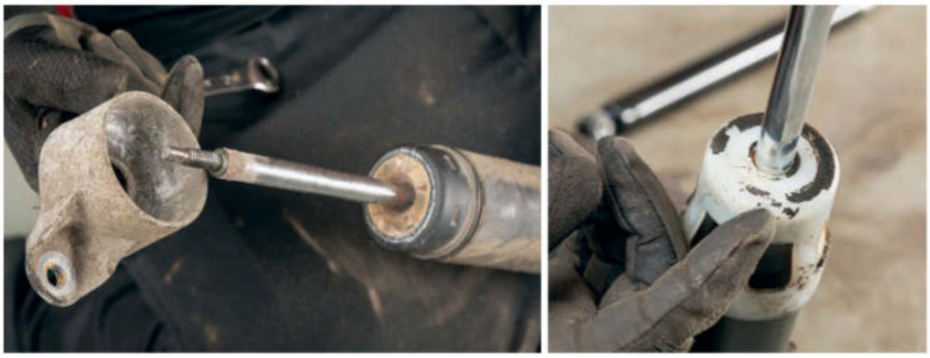
3 At this point the rear spring may be removed by lowering your jack and using spring compressors to compress the spring down enough to manoeuvre it out of place. That said, rear springs rarely break and need replacement on the Mk3 Focus so this process is rare. It will only be necessary if a visual inspection shows that rear springs are corroded or broken, or you're replacing with performance springs.



4 Remove the two upper mounting bolts using a 10mm socket and long extension bar. The shock absorber can now be lifted out from under the arch.



5 The top mount can be removed using a 13mm swan neck spanner. The flat part at the top of the central piston must be held with a set of pliers or grips to stop it spinning as the nut is removed. Alternatively, this can be held in a bench vice.



6 Once the nut has been removed, slide off the top mount and the dust cover. Note: Now the strut can be inspected for leaks/seepage at the top, and also by compressing the piston by hand, it should offer hard resistance and be difficult to push the piston into the damper body – if in doubt compare the resistance to the new strut.

7 ◀ Slide the OE dust cover and top mount onto your new strut.

8 ▶ Install the new nut that is supplied with your shock and tighten down. Never reuse the old nut. Note: Ford specify a torque of 25Nm for this nut but, again, it's unlikely that the specialist tools, will be available. This nut does not have to be extremely tight just ensure it is tightened down sufficiently hold the top mount in place securely.

9 ◀ Starting with the two top bolts, install the new strut. Tighten the bolts until they seat. Note: For estate models, begin with the bottom bolt and reinstall the top bolt in Step 10.

10 ▶ Compress the shock until the bottom mounting hole lines up and install the bolt. Tighten until seated. Finally tighten all three bolts to their specified torque – 25Nm at the top and 115Nm at the bottom. Reinstall wheels and torque nuts to 135Nm.

VAN ORDINAIRE

Owning a van can bring many practical benefits but keeping up with neighbours called Jones isn't one of them. **Alan Anderson** shows how we combined a repair with a touch of customising at the same time.

Never the prettiest of things but the Kangoo-derived Citan LCV looks particularly drab despite its poser Mercedes three-pointed star nose.

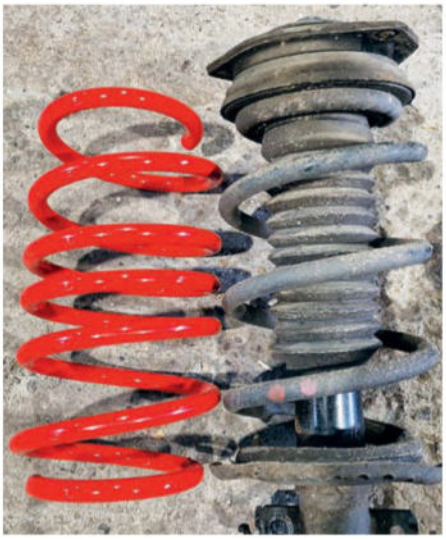
According to insurance specialist Green Insurer, vans are becoming increasingly popular buys, particularly among young drivers where one in four 25 to 34-year-olds are considering buying one over a car when they purchase their next vehicle.

According to the company, three in 10 (29%) quizzed say they use their vans for both work and leisure, and for 71% of respondents their lifestyle versatility and adaptability is one of their top three reasons for switching to a van.

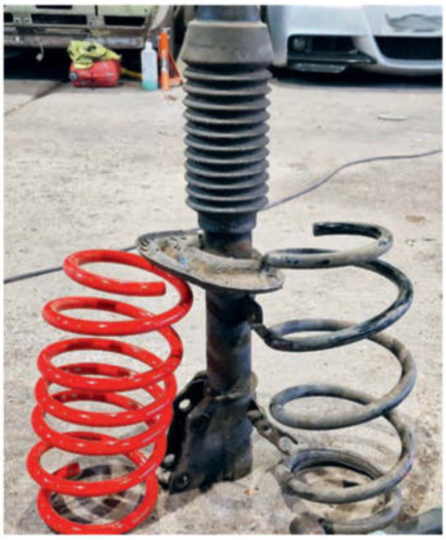
Our 2018 Mercedes-Benz Citan crew-cab purchased last year, provides all this, plus is boringly reliable, versatile, dependable and extremely frugal. But, well... just boring to look at!

A broken rear coil spring, probably caused by one of the zillions of potholes which infest our roads, provided a good excuse to not only replace the errant component but upgrade at the same time by substituting all corners with lowered springs to give a sportier look and improve the handling. Thanks to their necessary generous ground clearance, this is one of the most popular, cost-effective mods among the van fraternity. Naturally, if you intend to use yours as it's intended to the fullest then fitting a non-standard suspension requires thought beforehand but it's as well to know that manufacturers have been marketing 'sportifed' vans for the best part of 20 years, chiefly to owner-operators wanting dual role transportation for work rest and play purposes with no ill effects.

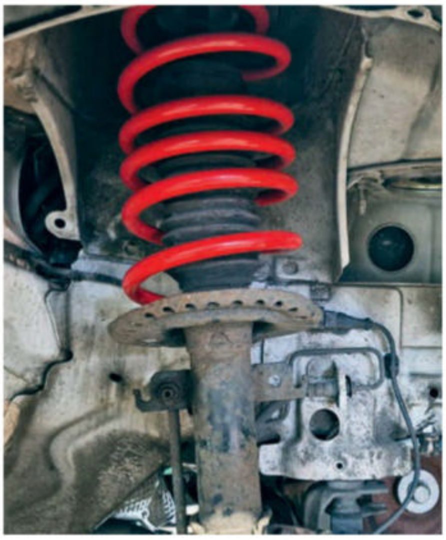
Although our van is badged Mercedes, it's really a thinly disguised Renault Kangoo which itself it broadly Clio-derived meaning obtaining the necessary parts presented no problems. Our sportier springs, with a 30mm front drop and 25mm rear, is one of many kits advertised on websites of varying names, quality and prices so take your pick. Ours cost £150 for the four which compares well with normal items bearing in mind that you should really change them in axle set pairs. That said if we were



Strut removal on this van is no different to car although on Citan it required some disturbing of the under-bonnet scuttle to gain access to top mount bolts.



Notice not only how much shorter the new springs are but also their slightly thicker coils. It's a good idea to check the damper strut and outer sleeve while you're about it.



Ensure new spring fits properly against its stops before securing top mount and refitting the rebuilt strut. Rears, being normal telescopics, were easier to swap.

doing it again then may have chosen a complete kit inclusive of new dampers to kill two birds with one stone.

So long as you possess the usual tools including pair of stout spring compressors, their fitting is no different to a Clio or any modern vehicle to be honest, although in the case of this van you have to do a fair amount of dismantling the under-bonnet scuttle to gain access to the strut top mounting bolts. The rears are easily accessed after disconnecting the lower damper eyes in contrast. Incidentally, first-gen Kangoos employed a torsion bar at the rear which was changed over to simpler, cheaper coils, in 2007 due to their frequent axle breakages. Conversions are apparently available although hardly a viable proposition.

Wheels & tyres

It was always the intention to substitute the standard steel wheels along with their near the legal limit 195/65 x15 tyres with something more purposeful looking come replacement time. The former (second-hand alloys and in quite presentable nick) came from a local seller costing £70 while the budget brand Aptany 215/50/17 Sport Ultra tyres (no, I've never heard them either but with around 700 makes available why should I?) were sourced from a typical website at a remarkable £41 each delivered although professional fitting and balancing is extra of course.

Overall, for a total cost of comfortably under £400, the results are more than satisfactory. The lower centre of gravity has cut down roll notably and together with the larger grippier tyres – which despite their origins don't perform badly at all – endows the chassis with a much sharper feel. Admittedly it's no GTi but has become certainly more interesting and satisfying to drive while the ride – always firm on any van when unladen anyway – remains just about tolerable.

The standard steel wheels along with their centre caps were still in a reasonably good nick and just spraying their hubs black would have them looking different cheaply. Or just fit aftermarket wheel covers.

We think these larger 17in second-hand alloys came from an upmarket model. The tyres are budget brand Aptany 215/50/17 Sport Ultras and, while bought for their looks, perform quite satisfactorily.

Being a crew cab, desirable privacy side windows aren't fitted. However, a cheap £15 tint wrap was easily applied. The front side windows are next but legally their tint must let 70% of light pass through as penalties can be severe.

Looks?

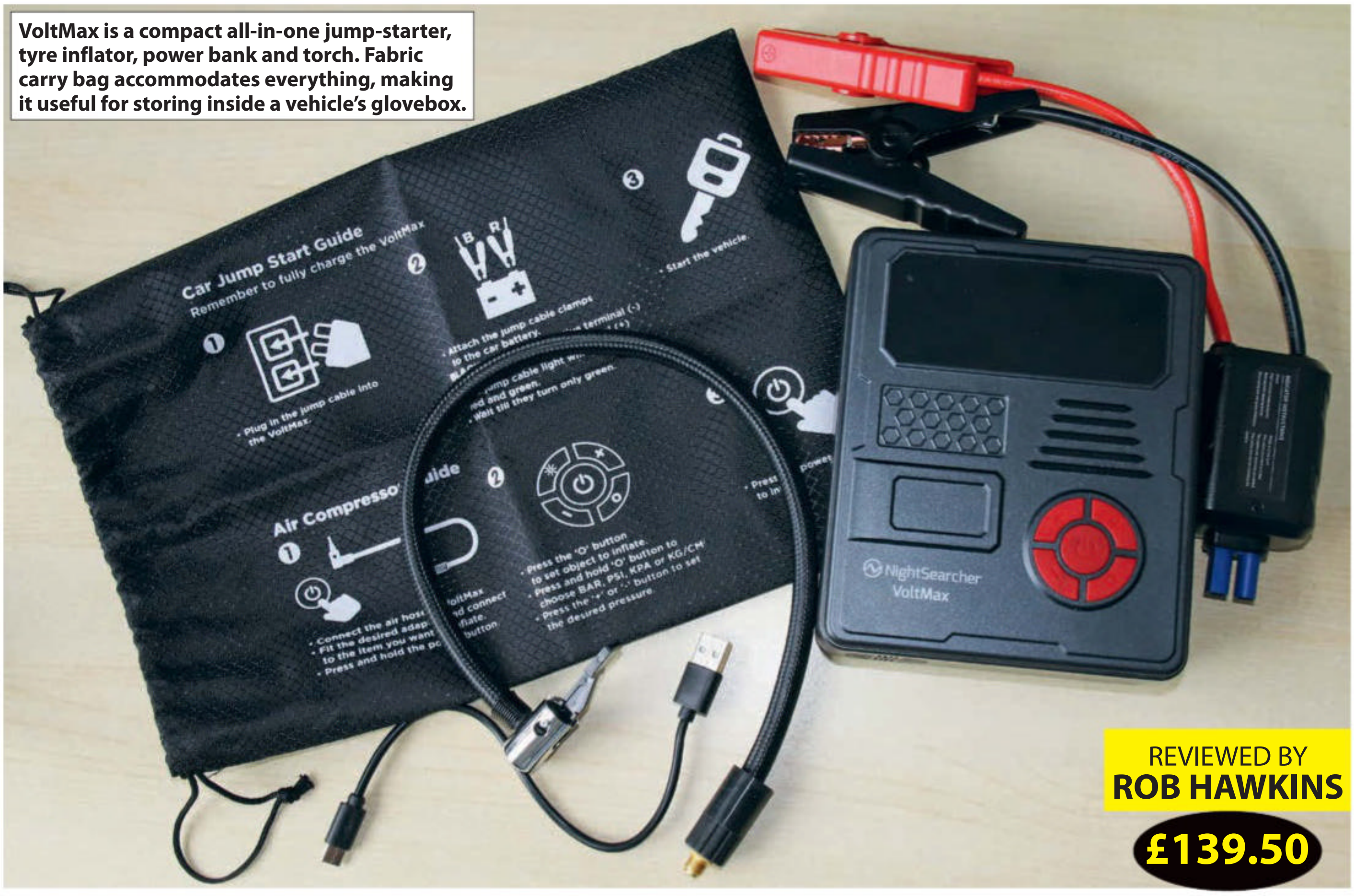
Well, that's subjective of course because this van, irrespective of what nose and badge it wears, is hardly a thing of beauty anyway. Every little helps as they say and the mods provide a useful distraction!

Hardly a transformation but definitely an improvement, especially after a good wash. Perhaps some deft coachlines will break up the white whale appearance.

Spotlight

See
www.nightsearcher.co.uk
for more details

Car Mechanics **reviews equipment available to help us motorists.**



VoltMax is a compact all-in-one jump-starter, tyre inflator, power bank and torch. Fabric carry bag accommodates everything, making it useful for storing inside a vehicle's glovebox.

REVIEWED BY
ROB HAWKINS

£139.50

NIGHTSEARCHER VOLTMAX

▶ Hampshire-based NightSearcher specialises in portable lighting and was established back in 1989. The VoltMax is one of its latest products, which joins the ranks of other portable all-in-one equipment that can jump-start a vehicle with a flat battery, inflate its tyres, recharge a mobile phone and provide illumination. This type of equipment is perfect for storing inside a vehicle to help get you out of all sorts of trouble.

The VoltMax is a noticeably compact piece of equipment, measuring 127mm wide, 50mm deep and 153mm long, and weighing in at a little over one kilogram. Its attachments, comprising a 45cm-long hose (for inflating tyres), similarly short jump leads and a very short USB-A/USB-C lead add a little extra bulk, but everything is stored in a neat-looking fabric carry bag with drawstrings. I particularly liked the simple instructions printed on the bag that remind you how to use the VoltMax – a better approach than having to carry a paper user manual that inevitably gets lost.

Inside the VoltMax, there's a 14.8V lithium-ion rechargeable battery, which is rated at 13,000mAh (13Ah). NightSearcher states it takes up to 5.5 hours to fully recharge it and they recommend recharging when the battery power is below 80% (they also recommend recharging after use and once every three months when not used).

Recharging the VoltMax is only possible using a USB-C lead plugged into the appropriate port, which is labelled TYPE-C IN. The state of charge of the on-board battery is displayed as a percentage and also as a battery status symbol with four bars on the VoltMax's screen. It's only displayed after switching it on, which requires the on/off button to be held down for three seconds, so it can't be accidently pressed and switched on. I found it very straightforward to recharge the VoltMax and the battery status remained displayed throughout.

Recharging other equipment is conducted through the USB-A port, which is usefully labelled USB OUT. Whilst the supplied lead is very short (25cm) and has a USB-C plug at the opposite end (it can also be used to recharge the VoltMax's battery), it's a universal type so other leads can be used instead.

The VoltMax needs to be switched on to recharge a connected device, such as a mobile phone or a torch. Throughout the recharging of other equipment, the battery status of the VoltMax is permanently displayed, which helps to show whether it also needs to be recharged.

The online user manual for the VoltMax explains that whilst recharging other equipment, pressing the light button for three seconds will display the voltage of the on-board battery, which is a maximum of 16.8V. I wasn't sure whether this helped any more than the battery status indicator or the percentage charge value displayed.

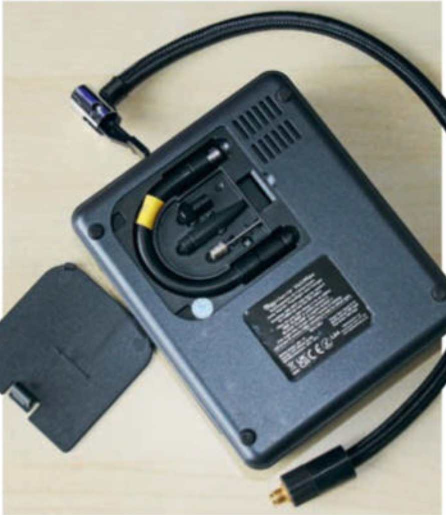
It's perhaps more useful knowing the voltage of the on-board battery prior to jump-starting a vehicle, so I attempted to jump-start a 2007 Ford Fiesta. The supplied jump leads are quite short at around 30cm from end-to-end, but long enough to connect to a battery's terminals. Once connected, and with the VoltMax switched on, a green light needs to illuminate on the connector plug of the jump leads to indicate an attempt to start the engine can be made. If the green light doesn't illuminate, the vehicle's battery may be too low or the VoltMax's battery needs recharging

Recharging the VoltMax's on-board lithium-ion battery can take up to 5.5 hours via a USB-C connection to mains electricity. Battery status light flashes one of its bars to indicate recharging is underway.

▶ Ring Automotive torch with its flat battery took almost three hours to recharge, switching off automatically afterwards. The VoltMax's on-board battery was reduced from 96% charged to 66%.

The Fiesta's 12V battery was too flat to start its petrol engine, but the VoltMax came to the rescue. Digital display shows the state of charge of its on-board battery, which needs to be over 60% to help with jump-starting.

When compared with a calibrated digital tyre pressure gauge, the VoltMax was very close. With psi readings in 0.5 increments, it's accurate enough. Setting a target tyre pressure takes a few seconds, then the VoltMax can inflate and automatically switch off when it's reached.



Inflation tools include a 45cm-long hose with a quick-release Schrader valve connector, but also a shorter screw-thread hose with attachments for footballs and airbeds.

(it should be at least 60% charged). If red and green lights flash, it means there's a problem with the connection to the battery.

The Fiesta's battery was so flat it couldn't operate the central locking and failed to display any dashboard readings after switching on the ignition. With the help of editor Martyn, we noticed that a green light wasn't displayed when the VoltMax was first connected to the vehicle's battery, but after reconnecting the two crocodile clips to the battery terminals, we were good to go. A twist of the ignition key saw the Fiesta's petrol engine fire into life.

NightSearcher claims the VoltMax caters for petrol and diesel engines up to 6.0-litre and 4.0-litre respectively. We're always a little sceptical about such claims, partly because the capability of turning an engine isn't solely determined by its capacity but also needs to take its compression ratio into account, for example. However, it's safe to say that it can be used with petrol and diesel engines for most of the typical or popular vehicles, although only for 12V systems.

Tyre inflator

Another important and useful feature of the VoltMax is its on-board air compressor, which is powered by its rechargeable battery. A 45cm-long hose is included and has a quick-release connector to attach to a Schrader valve (car tyre valve). However, tucked inside a small compartment in the back of the VoltMax, there's a much shorter hose with an assortment of attachments to help inflate footballs and airbeds.

I was keen to know how well the VoltMax could inflate car tyres and whether it provided an accurate pressure reading. Using a calibrated digital tyre pressure gauge from PCL, the reading on the VoltMax at 25psi was almost identical, which was impressive to see.

Pressure readings can be displayed in psi, bar, kPa and kg/cm^2, with target pressures for car, motorcycle and bicycle tyres.

A target pressure is set by pressing the buttons labelled with + and – symbols, which isn't permanently stored (in psi, the target pressure always returns to 36psi).

I inflated a tyre from 25psi to 30psi and it took a mere 41 seconds, rising in increments of 0.5psi and automatically switching off the air compressor once the target pressure had been reached. Disappointingly, the pressure reading dropped by 0.5psi after a few seconds, so I tried to fudge this by setting the target pressure to 30.5psi, which helped to achieve the target value. It's a common problem with inflating tyres (the pressure has to settle), so some tyre inflators compensate for this by inflating beyond a target pressure.

The last feature worth mentioning is the VoltMax's illumination, and there are two of them, which act as torches and flashing lights (red and white).

NightSearcher's VoltMax is a useful piece of equipment to carry on board your vehicle. It's straightforward to use and comes with an impressive five-year warranty.

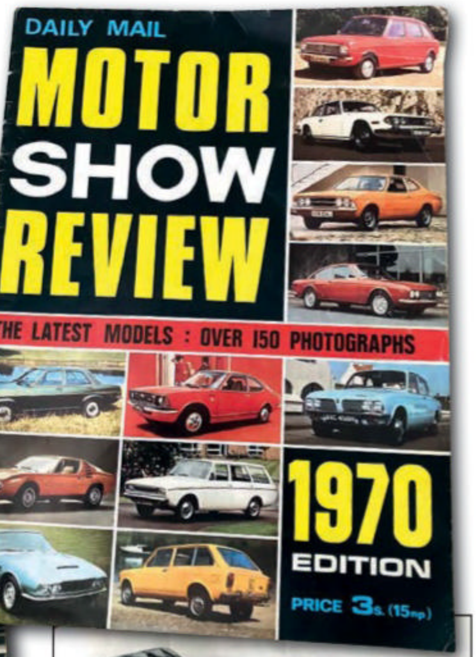
1970-1971 MOTOR SHOW REVIEWS

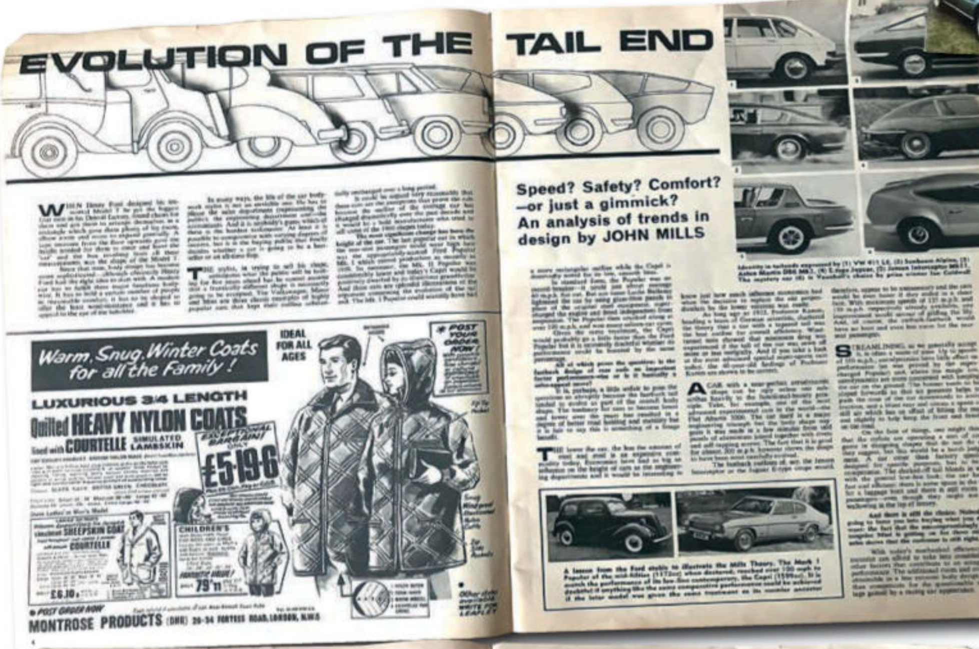
CM reader, Liam Preston, finds 1970s Motor Show reviews from two national newspapers.

▶ Liam says: we found these reviews when clearing out some of my aunt's personal papers, Joan Preston, who is now 87 years of age. Joan passed her driving test at 17. We came across the following editions – The *Daily Mail* and the *Daily Express* Motor Show reviews for the years 1970 and 1971.

The four volumes are a very interesting read and I have never come across them before. Personally, I didn't start driving until 1973 and the car we were required to drive when learning was a 1969 Moskvitch saloon. Our parents had an automatic and so a manual was required to pass the test. No synchromesh on any of the gears meant that double declutching became second nature. That vehicle lasted a few more years enabling another three of my siblings to pass their tests!

I asked my aunt why she had kept the four magazines and she told me that she had chosen her one and only new car in 1971 by going through the magazines, looking at which cars took her fancy and comparing the prices of those she was interested in. Her decision was the Ford Capri 1600.


DAILY MAIL
MOTOR SHOW REVIEW
THE LATEST MODELS : OVER 150 PHOTOGRAPHS
1970 EDITION
PRICE 3s. (15np)


EVOLUTION OF THE TAIL END

Speed? Safety? Comfort? —or just a gimmick? An analysis of trends in design by JOHN MILLS

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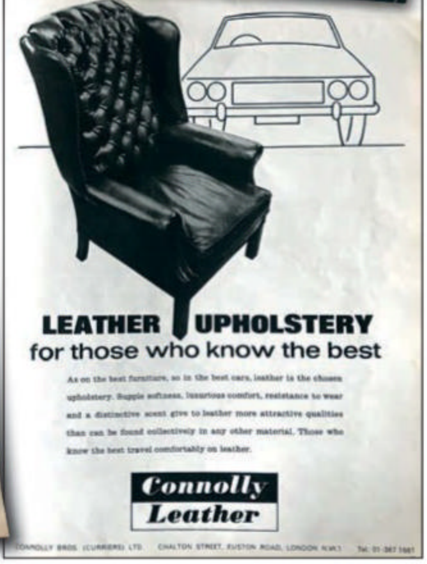
LEATHER UPHOLSTERY
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As on the best furniture, so in the best cars, leather is the chosen upholstery. Supple softness, luxurious comfort, resistance to wear and a distinctive scent give to leather more attractive qualities than can be found collectively in any other material. Those who know the best travel comfortably on leather.

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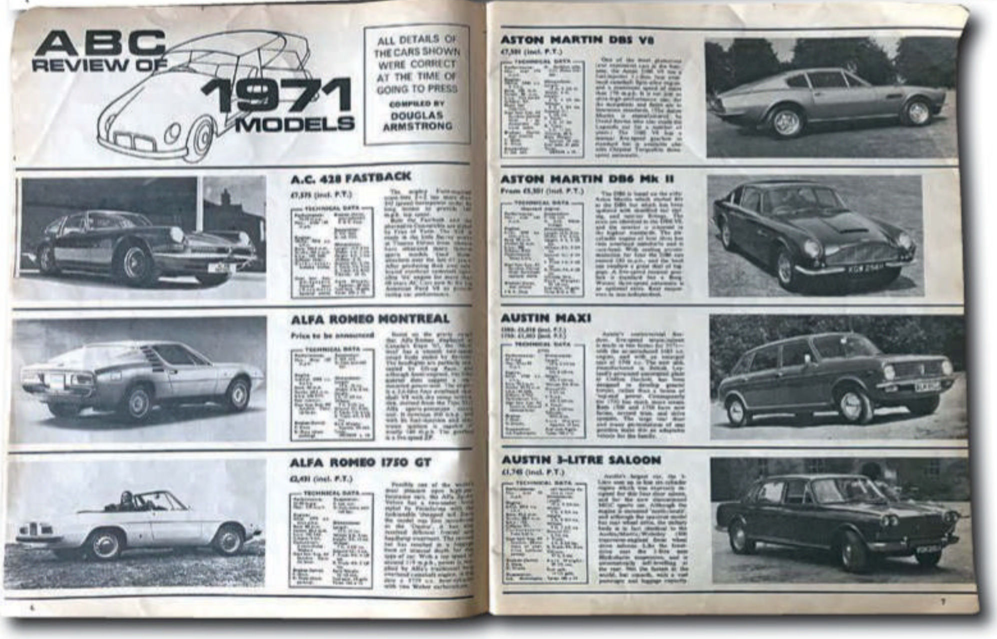
ABC REVIEW OF 1971 MODELS

ALL DETAILS OF THE CARS SHOWN WERE CORRECT AT THE TIME OF GOING TO PRESS
COMPILED BY DOUGLAS ARMSTRONG

A.C. 428 FASTBACK

ALFA ROMEO MONTREAL
Price to be announced

ALFA ROMEO 1750 GT

ASTON MARTIN DBS V8

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AUSTIN MAXI

AUSTIN 3-LITRE SALOON

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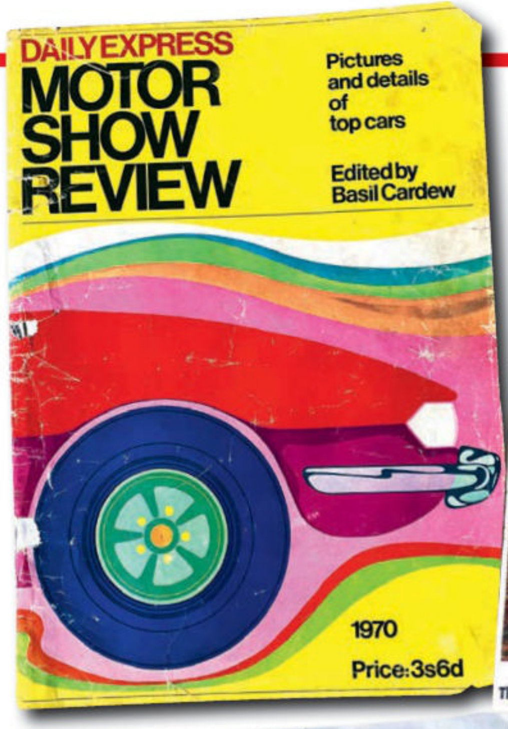
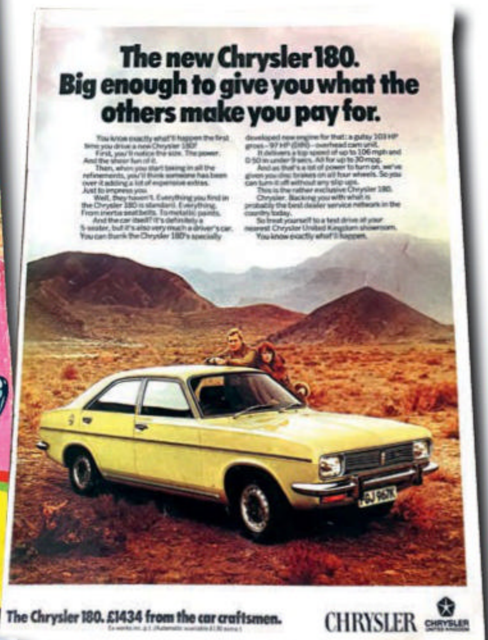
BRITISH

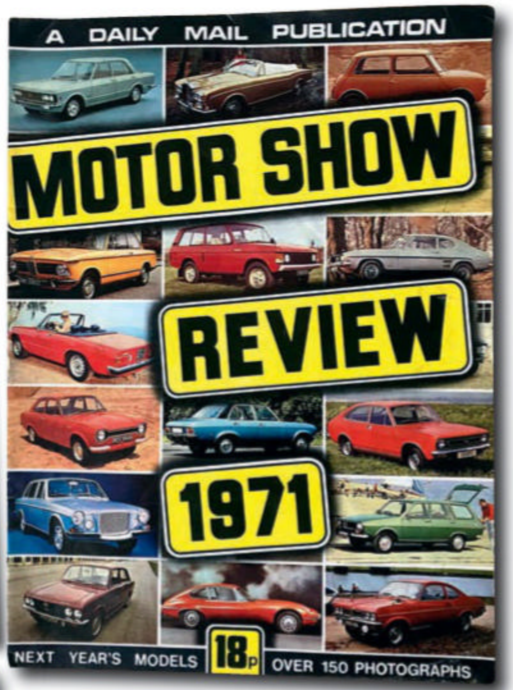


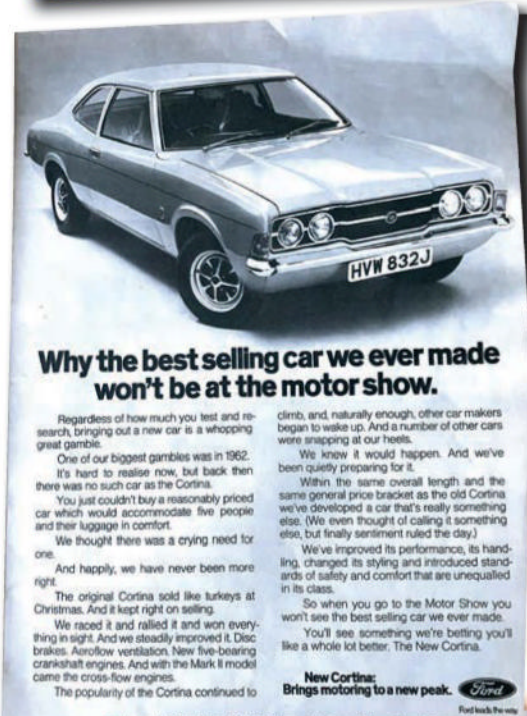


The new Chrysler 180. Big enough to give you what the others make you pay for.

The Chrysler 180. £1434 from the car craftsmen.

CHRYSLER





Why the best selling car we ever made won't be at the motor show.

Regardless of how much you test and research, bringing out a new car is a whopping great gamble.

One of our biggest gambles was in 1962.

It's hard to realise now, but back then there was no such car as the Cortina.

You just couldn't buy a reasonably priced car which would accommodate five people and their luggage in comfort.

We thought there was a crying need for one.

And happily, we have never been more right.

The original Cortina sold like turkeys at Christmas. And it kept right on selling.

We raced it and rallied it and won everything in sight. And we steadily improved it. Disc brakes. Aeroflow ventilation. New five-bearing crankshaft engines. And with the Mark II model came the cross-flow engines.

The popularity of the Cortina continued to climb, and, naturally enough, other car makers began to wake up. And a number of other cars were snapping at our heels.

We knew it would happen. And we've been quietly preparing for it.

Within the same overall length and the same general price bracket as the old Cortina we've developed a car that's really something else. (We even thought of calling it something else, but finally sentiment ruled the day.)

We've improved its performance, its handling, changed its styling and introduced standards of safety and comfort that are unequalled in its class.

So when you go to the Motor Show you won't see the best selling car we ever made.

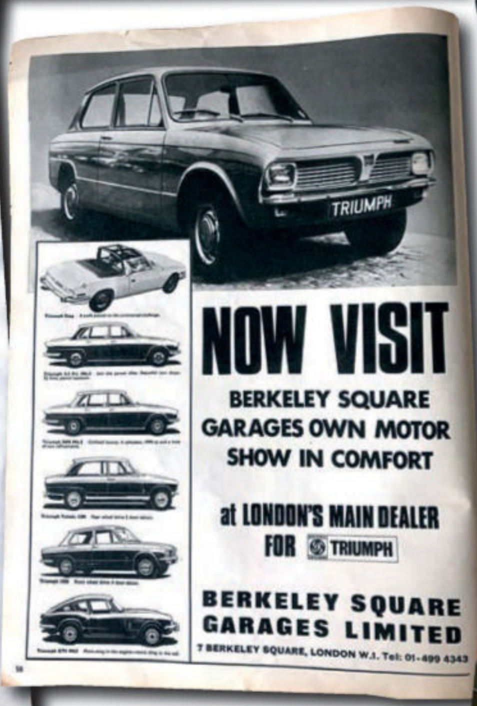
You'll see something we're betting you'll like a whole lot better. The New Cortina.

New Cortina: Brings motoring to a new peak.

Ford leads the way

See the 1971 Cortina, Escort, Capri, Zephyr and Zodiac models on Stand 134.

21



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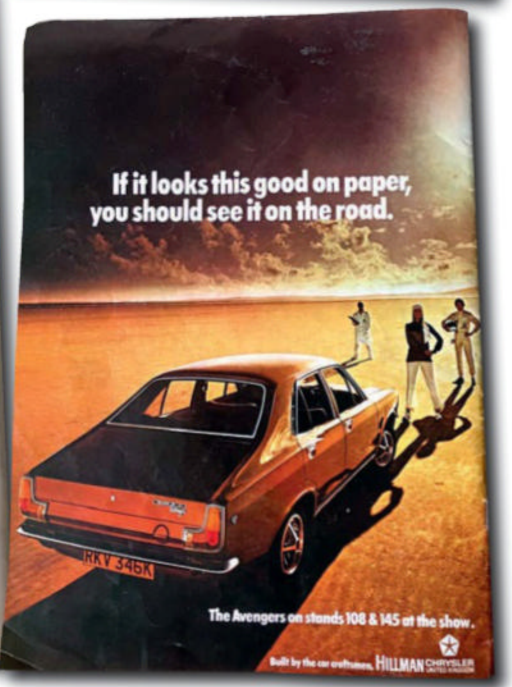
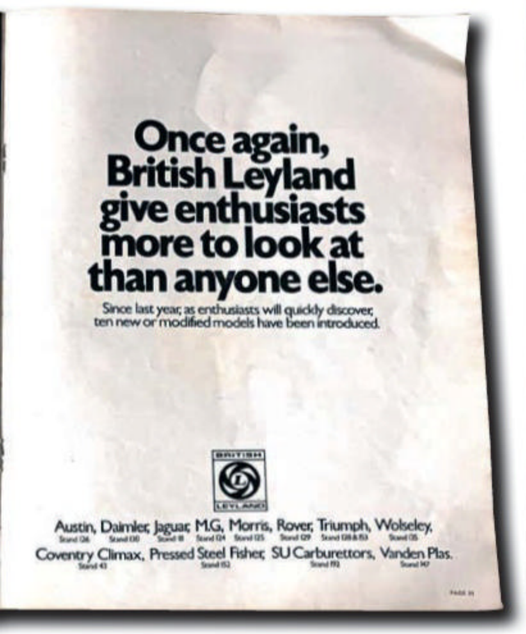


If it looks this good on paper, you should see it on the road.

The Avengers on stands 108 & 145 at the show.

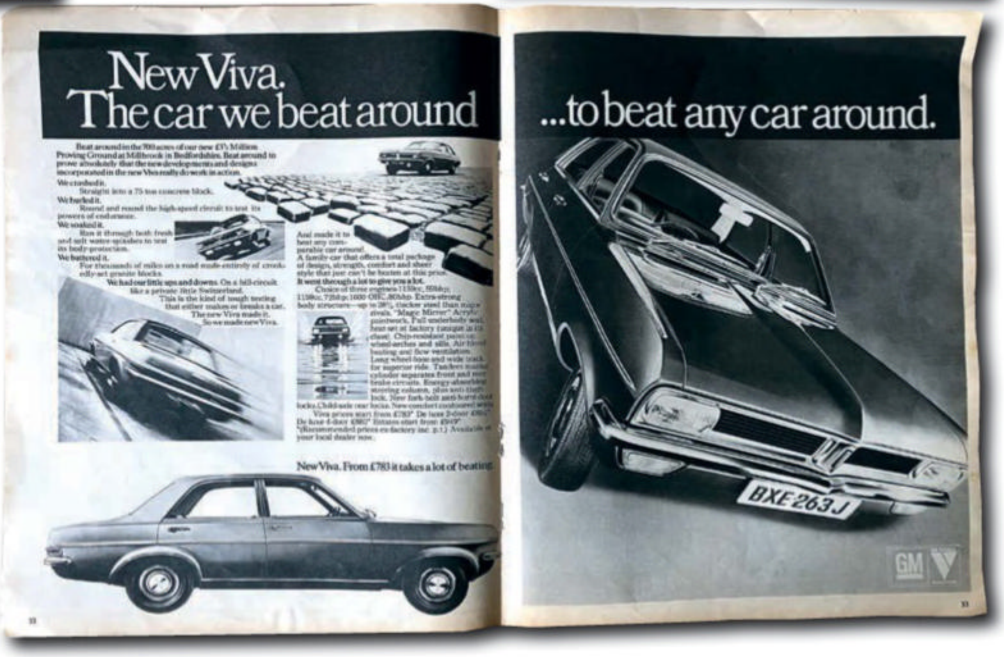
HILLMAN CHRYSLER



Once again, British Leyland give enthusiasts more to look at than anyone else.

Since last year, as enthusiasts will quickly discover, ten new or modified models have been introduced.

Austin, Daimler, Jaguar, M.G, Morris, Rover, Triumph, Wolseley, Coventry Climax, Pressed Steel Fisher, SU Carburettors, Vanden Plas.

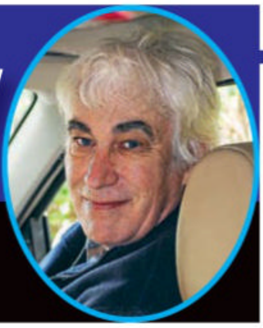


New Viva. The car we beat around

...to beat any car around.

New Viva. From £783 it takes a lot of beating.

Dealer's Diary



Peter Simpson provides us with an insight into the automotive sales trading world – and beyond.

Not yet!

ASTON BARCLAY
Vehicle Remarketing
2 METRES

▶ The planned takeover of the Aston Barclay Action Group by Constellation Automotive (owners of British Car Auctions) that we reported last month, is now in doubt as the acquisition has been 'called in' by the Competition and Markets Authority (CMA).

The CMA carries out functions once undertaken by the Monopolies and Mergers Commission and have the power to prevent mergers and acquisitions from going ahead if they believe that 'a substantial lessening of competition' will result. If they believe there will be loss of competition, they can, and will, block completion of an acquisition or even force an already-completed one to be unwound.

Not all 'called in' acquisitions and mergers that are called in are, however, stopped. Often, the parties involved provide evidence that significant competition remains, and the CMA have a legal obligation to act fairly to all concerned. Additionally, when the concern being acquired is thought, or known, to be struggling, the CMA also must consider whether the firm being taken over is capable of surviving in its own. If they believe that it is not – in other words that the business is likely to contract or close if not taken over – then they may well allow the takeover to go ahead on the basis that if they don't, and the weaker business fails, element of competition provided by the firms concerned being rivals will be lost anyway. In such cases then they may well allow the takeover to go ahead to preserve jobs.

The CMA announced their investigation, under Section 72(2) of the 2002 Enterprise Act, on May 13, but a date for the enquiry has yet to be set. In the meantime, the individual brands must be retained, and the businesses themselves must remain separate. Key staff cannot move between Aston Barclay and Constellation, and any changes to either firm's organisational structure will require written permission from the CMA.

British Car Auctions are Britain's biggest car auction group, with 24 sites in England and Scotland. The Aston Barclay takeover would have added another five. The UK's second-largest group by site number is Manheim, which currently has 12 sites.

Battery Bargain

▶ The other day, a local trader to me had a slightly odd complaint; a car that he had sold about eight months ago now needed a new battery. Under normal circumstances a battery failure after eight months would have been a straightforward – sorry, not my responsibility/wear and tear item situation. Here, though, the situation was slightly different in that the battery that had failed hadn't long been renewed when the car was sold.

It was not, however, the correct one for the car in question. Rather, it was an inexpensive 'leisure' battery of the type sold for caravans and similar uses, than the correct one for the car, which happened to be an extremely expensive one – around £250 in fact...

This, of course, posed an interesting problem. The 'six months' rule is quite specific – for the first six months after purchase a fault that develops is deemed to have been present at the time of sale, unless the trader can prove otherwise. After six months the burden of proof switches to the customer. In normal circumstances this gets the dealer off the hook, as it's pretty-much impossible to prove that a fault which shows up after six months was starting to develop at the time of sale.

This case, however, was different, as the underbonnet photographs used in the car's advertisement clearly showed that the wrong battery was fitted at the time, and the car's paperwork even included a receipt for the 'new battery.' So, on the face of it, the dealer was liable.

In the circumstances, the dealer in question was able to reduce his potential payout from £240 to around £70 by suggesting to the customer that they 'go halves' on a new battery from

Halfords. This would come with a four-year guarantee which can be honoured at any Halfords branch, so was a very good deal for the customer.

Because the dealer had a Halfords Trade Card, he would get approximately 20% discount, meaning the £240 battery actually cost him £192. But because the customer isn't 'trade' he isn't entitled to trade discount, so pays the full £120 for his half. Consequently, the net cost to the dealer is £72. Or even less if he can reclaim the VAT on that £72.

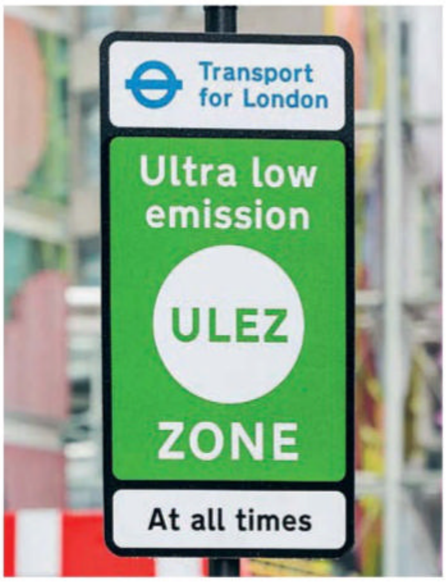
£2400 ULEZ fines!

A trader I know 'down south' had a rather nasty shock the other day. Eight months ago, he sold a 2014 diesel Focus.

As usual, he did the V5C transfer online. This normally results in a replacement document being produced immediately. In fact, I'm told that the reason for this online transfer service being available between 7.00am and 7.00pm only is that when you key in the new keeper details that information goes straight to the printer, which for safety reasons has to be attended when operational.

Anyway, somewhere along the line, the house number was recorded wrongly, and the V5C went to the wrong house. However, the customer did nothing about this for six months, despite the DVLA saying you should contact them if the document hasn't arrived after six weeks.

After this the tale started getting very strange. The guy claimed that once the address had been corrected, he received £2440 worth of ULEZ fines and non-payment escalation charges. He claimed that these were the dealer's responsibility because, although the car had not been sold as ULEZ-compliant, and at no time had the dealer said that it was, he had assumed, having driven into the zone once and not received a fine, that it must be! But the fines were going to the wrong address.



Anyway, the guy was demanding that the dealer pay all the charges "or I will take you to court."

I don't know about you, but I spy 'bovine excrement' here on many levels. First off, who in their right mind assumes a car is ULEZ compliant when checking online is dead-easy? In fact, it's surely the first thing that anyone buying a car which might be used within a ULEZ zone would check. Then, having made such an assumption, it takes an even greater level of stupid to 'test' that hypothesis by driving into the zone, not paying, and waiting to see if a fine arrives!

I can't be sure of course, but my gut-instinct is that this might even have been a deliberate ploy to try and evade ULEZ charges, by intentionally registering the car close-by. However, those who enforce these charges have a significant range of tools at their disposal including checking insurance details and comparing vehicle and driver records.

Like them or loathe them, ULEZ charges are legally enforceable. They are also pretty-much impossible to avoid, and if you don't pay, the added sums will soon add up to a hefty amount.

Needless to say, the customer in question was given a very, very, firm 'no' along with a polite request to source his cars elsewhere in future. In response, he reiterated his intention to take court action. I'll let you know if he does.

Sell on commission...

In early May, ITV reported allegations of 'serious fraud' by Harlow-based 'Happier Cars', run by a Charles Cavendish who had, it was alleged, conned customers out of around £740,000 by taking cars for sale on commission, and then not forwarding the proceeds. Around 50 cases have been reported, and it was also alleged that Happier Cars was trading illegally, as the business had filed to be dissolved in August 2024.

Significant sums were involved. One customer allowed his Tesla Model S to be sold by the company. A buyer paid £22,000. But the Tesla owner never received any of the money. Another allowed Happier Cars to sell his £16,000 BMW, but when none of the proceeds came his way, he reported the car as stolen. The police found it and impounded it as evidence.

How this will be resolved I don't know, but I really can't see there being a happy outcome. It's also highly unlikely that anyone's insurance will cover this loss, given that the cars keys and documentation were handed over voluntarily. This case does, though, highlight the dangers involved in commission/consignment type sales. Most dealers who sell cars this way are honest, and with a specialist type of vehicle it can work well.

But you are placing a massive amount of trust in the dealer concerned. The 'test' I would apply is whether you would trust the person you are thinking of entrusting your car to with 'looking after' the same amount as it is worth in cash. If you would, then go ahead. But if you wouldn't, it might be wise for look for other options

Tom Farmer

Finally, this month. I do want to mention briefly the passing of Tom Farmer, founder of the Kwik Fit chain. Sir Tom died on May 9, aged 84. He started Kwik Fit in 1971 and grew it to over 2000 branches before selling the whole chain to Ford in 1999 for over £1billion, though he remained CEO under Ford until 2002. In 2003 he founded another car tyre business; "Tyres 'n' Wheels Autocare" with an initial three branches in his native Edinburgh. The company was later renamed "Farmer Autocare" and grew into 21 centres located across central Scotland.

Like most successful businessmen, Farmer wasn't without controversy. Under his ownership Kwik Fit did acquire something of a reputation for 'upselling' customers parts and services which they didn't actually need. This practice which might well have been 'encouraged' by generous commissions paid to staff for additional sales. But many who worked at Kwik Fit recall him as a fair and reasonable boss who recognised that people on the shop-floor deserved to be rewarded properly for their labour, and who would on occasion don overalls himself.

Sir Tom was without doubt one of the most significant figures in the aftermarket side of the motor industry in the second half of the 20th century, and he will certainly be missed.

Buying & Owning

Ian Cushway searches out **new** and **used** parts prices

Chevrolet Cruze

The virtually anonymous Astra-based Cruze is cheap as chips to buy and should prove reliable and inexpensive to run, too.

With money being rather tight just now, compact family cars like the Astra-based Chevrolet Cruze make an awful lot of sense. Afterall, it's a car that's packed with features, offers decent practicality and having suffered savage depreciation is now for sale in the classifieds at a fraction of its already value-packed price when new.

The Cruze broke cover in saloon guise here in early 2009 with a choice of three engines; a 1.6 and 1.8-litre petrol with variable valve timing and a 2.0-litre 148bhp common-rail diesel. The petrol options were offered with a choice of an auto transmission, while the diesel was only available with the manual 'box.

The 123bhp 2.0 VCDi diesel joined the line-up later that year, with Chevrolet relenting when it came to gearboxes, offering the auto, finally, on the 148bhp oil burner in 2010.

Aware that the European market for saloons is somewhat limited, Chevrolet extended the Cruze range to include a handy five-door hatchback in July 2011, equipped with a 161bhp version of the VCDi unit, followed by the roomy Station Wagon estate a year later.

Meanwhile, possibly the best engine of them all – the punchy and efficient 1.7 VCDi – made its debut in May 2012.

When it comes to practicality, there's plenty of rear legroom in the Cruze – even in the hatch. Boot space is pretty generous, too; there's 413-litres available in the hatch, 450-litres in the saloon and a commodious 1478-litres in the estate with all the seats folded flat.

Another plus is the Cruze offers outstanding safety with all cars getting six airbags and traction control resulting in it gaining a five-star Euro NCAP rating.

So, what are the snags? Well, there aren't any apart from the fact that the styling's about as exciting as a wet weekend in Worthing and some of

Steering/suspension component prices

FRONT COIL SPRING (EACH)
Main dealer £42.72
Independent from £61.99

FRONT ANTI-ROLL BAR BUSH
Independent from £3.33

What model?

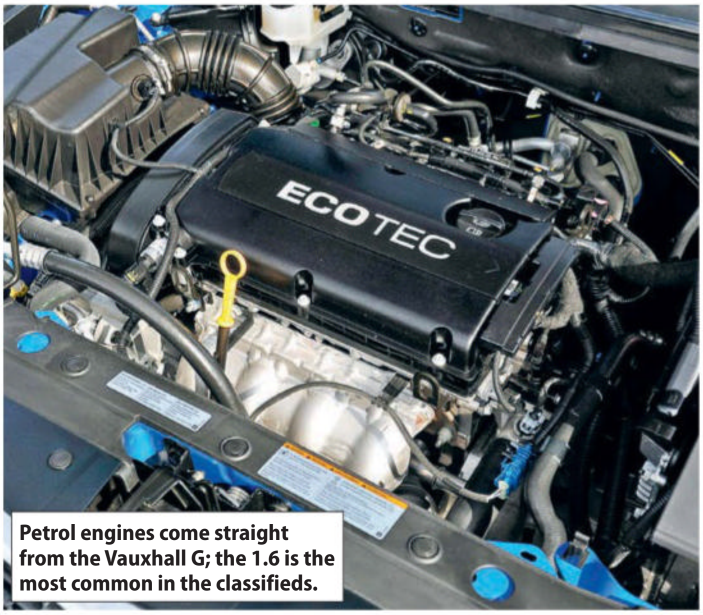
▶ Although the S came with aircon and remote central locking, you'll need to start at the LS if you want alloy wheels and step up to the LT if you want cruise. The range-topping LTZ got Bluetooth, bigger alloys, automatic headlights and rain sensing wipers, with the Exec Pack adding leather heated seats. Despite the fact the classifieds are packed with 1.6 petrol-engined Cruzes, it's worth seeking out a turbodiesel because they're punchy and you won't need to stop off at a fuel station as often. If your budget can stretch a little further, the 1.7 is the best engine of the bunch. That said, if you're doing short, town centre trips the 1.6 will be fine and you'll avoid getting anxious about the DPF light coming on.

Engine component prices

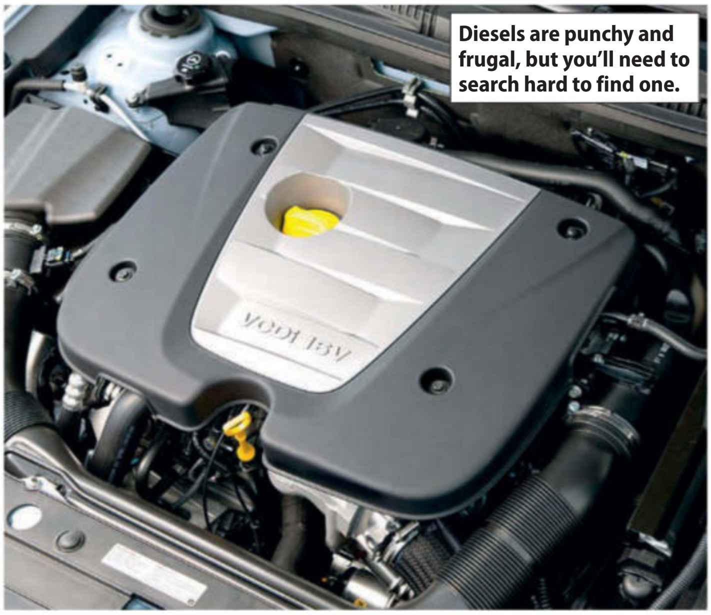
OIL FILTER
Independent from £4.29

WATER PUMP
Main dealer £177.66
Independent from £49.99

DPF
Main dealer £2149.73
Independent from £375.31



Petrol engines come straight from the Vauxhall G; the 1.6 is the most common in the classifieds.



Diesels are punchy and frugal, but you'll need to search hard to find one.

the materials used inside aren't very high-end. The grey seat fabric on ones we've seen for sale online, for example, looks very low rent. That aside, given its price and generally very good reliability record, it's definitely worth considering.

Regarding parts availability, we heard on the grapevine that Chevy parts could sometimes still be obtained from Vauxhall dealers, so we did a quick ring around. Most of the ones we spoke to no longer had the facility to look up Chevrolet parts but Toomey Vauxhall in Southend came up trumps and supplied us with the 'main agent' prices quoted here where available.

Engines

The two petrol engines and in particular the smaller 1.6 can feel coarse when pushed and are not that economical; the diesels are better and have proved very reliable with few known problems. The only likely issue with diesels that do short, town centre journeys is clogged Diesel Particulate Filters (DPF) so a regular motorway run keeping the revs high is recommended.

The oil and filter change interval is every 7500 miles and on engines with a timing belt, the official interval is 100,000 miles/6 years but we'd recommend doing it a lot sooner – say, every 60k miles instead.

No problems are reported with either the auto or manual transmission.

From our price comparison, you'll see we've only quoted for an aftermarket oil filter because when our helpful contact at Toomey looked, he could only find a reference for the complete filter housing, which was £95.82!

Saloon came first and still looks quite stylish if you choose the LT trim or above which came with alloys as standard.

Steering/suspension

The Cruze sits on the same GM Delta II platform as the Astra J and feels safe and stable. While it's not as involving to drive as other cars in its class like VW's Golf or the Ford Focus, it's comfortable and predictable. Steering feel depends on engine; with the petrols, it's light and vague and with the heavier diesel it feels a lot more precise.

⇨

Buying & Owning *CONTINUED*

Brakes

There was a recall in 2015 concerning leaky front brake hoses which affected 5630 cars made between 10/2008 and 05/2011, so check this been addressed if it affects your car. Other than that, there's little else to report regarding Cruze brakes apart from confirming there's discs front and rear. That said, as you can see from our price comparison, it's worth shopping around for the best prices.

Other issues

Apart from all the usual checks, ensure that the air-conditioning is functioning as it should. The compressor is no longer available, according to Toomey, so you'll need to go to an aftermarket supplier.

Oh, and beware of cars with lots of body scuffs and worn interiors – the Cruze's low value often results in owner neglect and making a scruffy example look smart again won't really be worth it.

How much to run?

▶ To be honest, the Cruze is a cheap car to run. Insurance grouping kicks off at just 14 for the 1.6 petrol, with Group 22 being the upper end for the most powerful diesel. Annual VED ranges from £35 for the 1.7 VCDi to £265 for the petrol models.

Handy hatch version of the Cruze arrived in 2011. The commodious Station Wagon joined the Cruze line up in 2012 but they're a rare sight in the classifieds.

Fabric dashboard top is touchy-feely but other plastics inside are less appealing and that light grey seat material doesn't wear well.

Brake component prices

FRONT BRAKE DISCS (PAIR)
Main dealer £179.71
Independent from £74.58

FRONT BRAKE PADS
Main dealer £69.01
Independent from £28.49

Other component prices

AIR-CONDITIONING COMPRESSOR
Independent from £247.17

USEFUL CONTACTS

Bilstein bilstein.com/en

What to pay

▶ Rubbish residuals mean there's some unbelievably cheap Cruzes out there. We would have expected the four-door saloon to be the least in demand model, followed by the hatch and the estate in that order although values in classifieds don't seem to reflect this.

Indeed, the cheapest Cruze we found was a high-mileage 2012 Station Wagon with the 1.7 VCDi engine in LTZ trim for just **£699**. A similarly high mileage 2014 1.6 LT hatch was a paltry **£995**. See, we said they were cheap!

Perhaps more of a long-term proposition was the silver 2009 2.0 VCDi LS saloon we spotted with just 79,000 miles under its belt, up at **£1695**. At the upper end of the price range, a 1.8 LTZ hatch in an attractive metallic blue with just 24,600 miles for **£5150** looked like a decent buy.

Bear in mind because values are so low, it would be a mistake to pay too much for a high mileage Cruze – simply because it will be virtually worthless in a few years' time. When buying a Cruze, it's a case of doing the sums, seeing how long you can run it for before you need to spend money on it, and being prepared to write it off after a few years of use. It's not a particularly 'green' way of looking at things, but it's probably the most logical.

Chevrolet Cruze 2009-2015

	1.6	1.8	1.7 VCDi	2.0 VCDi
Engine (cc)	1598	1796	1686	1998
Power (bhp)	122	139	128	161
0-60mph (sec)	10.6	9.8	9.5	8.2
Top Speed (mph)	118	124	124	127
Average fuel (mpg)	43	42	62	50

Verdict

▶ A victim of Chevrolet's historic association with Daewoo, the brand carries virtually zero street cred, and this has served to ruin residuals. That makes the Cruze a shrewd family car choice, as long as you can live with the lack-lustre interior and the fact it's not as nice to drive as many of its rivals.

Styling-wise, let's just say it's unlikely to turn any heads – but who cares when there's so much car on offer for so little money?

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- Also features: 4 x 4" wheels (2 fixed & 2 swivel with brakes).
- 3 x drawers for storage of oil service tools.

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7980 Oil Funnel Kit

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9113 Oil Drain Storage Station – Magnetic

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HIT the BRAKES

How to service your vehicle's braking system

BMW 318i

Rob Hawkins replaces the discs and pads on a 2011 BMW 318i.

The all-round brake discs on the E90 generation of the BMW 3-Series, especially a base model such as the 318i seen here, is quite a simplistic set-up. There are single-piston calipers at all four corners, secured with no-nonsense 7mm Hex slider pins. The discs are secured with a single 6mm Hex screw and whilst the caliper carrier needs to be removed to in turn remove a brake disc, the mounting bolts are accessible.

Wiring for a wear pad sensor is fitted at the nearside front and offside rear (attached to the edge of one of the brake pads), which must be changed whenever new brake pads are fitted, and diagnostic equipment has to be used to reset the brake pad wear settings. It's also important to ensure the wiring is correctly routed inside the wheelarch to avoid it fouling anything, especially on the nearside front, where the turning of the steering stretches it.

ESSENTIAL TOOLS

Hex bits: 6mm and 7mm
Sockets: 8-18mm
Torque wrench

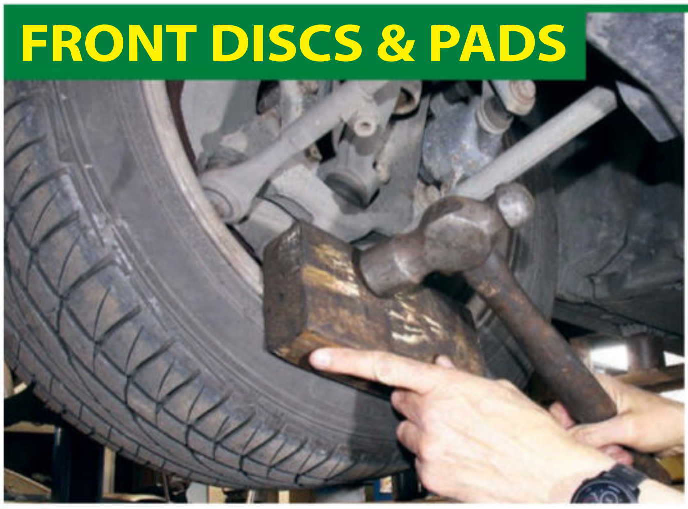
Should the rear discs need replacing, the handbrake shoes are concealed inside the centre section of each disc, which forms a brake drum.

Typical problems that can arise concern corrosion. We found all four road wheels had seemingly welded themselves to the hubs. A block of wood was held against the inner rim of the wheel, then hit with a hammer to help release the road wheel – refitting one of the wheel bolts ensured the wheel didn't disappear across the workshop floor.

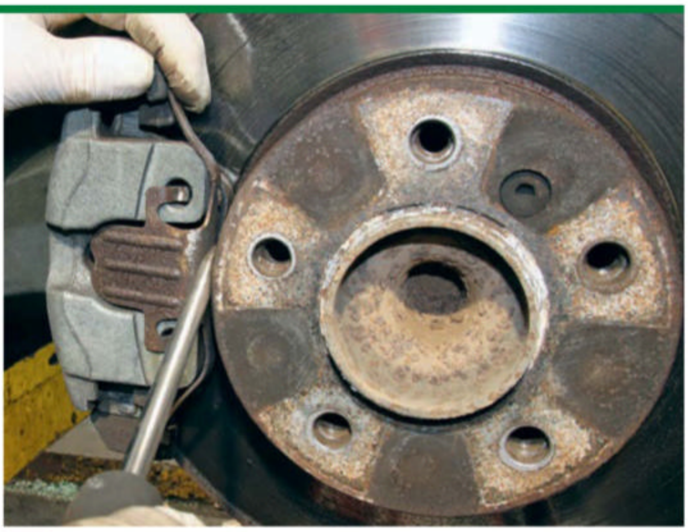
The 318i petrol model seen here belongs to our local garage, MJ Motors, who had recently acquired it. Looking at how new the front brake pads were in comparison to the excessive wear on the brake discs, this was an example of short-term cost-cutting.

The following steps follow the front discs and pads being replaced, but only the brake pads on the rear.

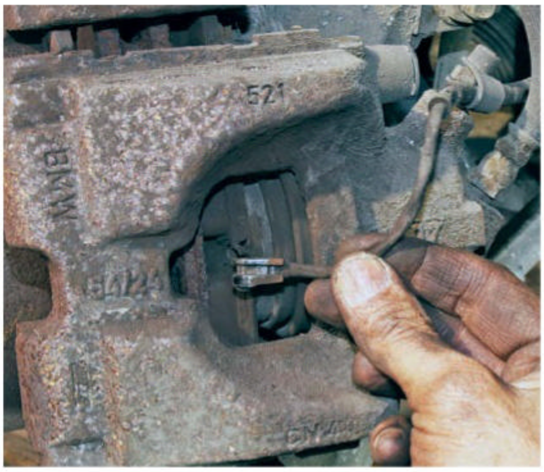
FRONT DISCS & PADS



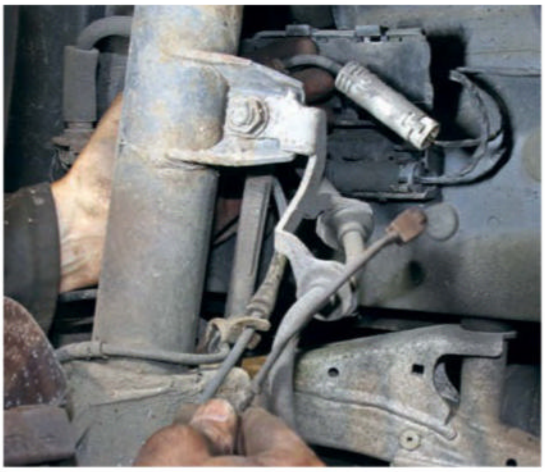
1 **Despite having plenty of depth to the brake pads, the front brake discs had a hard-to-miss lip on them. Rob began by removing the road wheels, which were seemingly stuck to the hubs, so he used a block of wood and a hammer to release each one.**



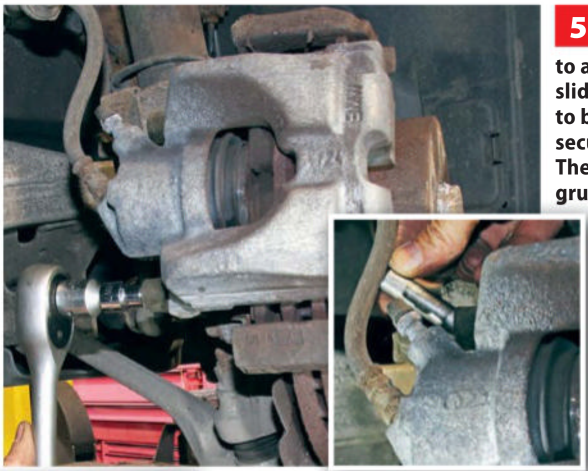
2 **A substantial metal spring clip helps to prevent the outer brake pad from rattling. Mike at MJ Motors stepped in to demonstrate the best way of extracting it by levering against the inner edge.**



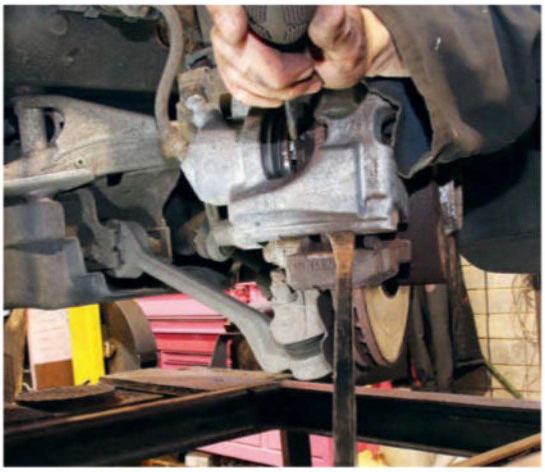
3 ◀ **On the nearside front, wiring for a wear pad sensor is attached to the rear edge of the inner brake pad. This wiring should be replaced when changing the pads. The end of it was straightforward to disconnect from the pad. As for the opposite end...**



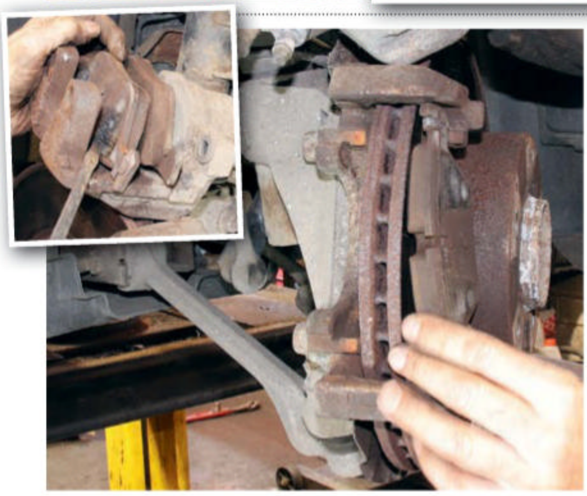
4 ▶ **...this was traced to the back of the wheelarch where a white connector plug sat inside a plastic housing. Rob made a note of how the wiring was routed and attached to a couple of mounting points.**



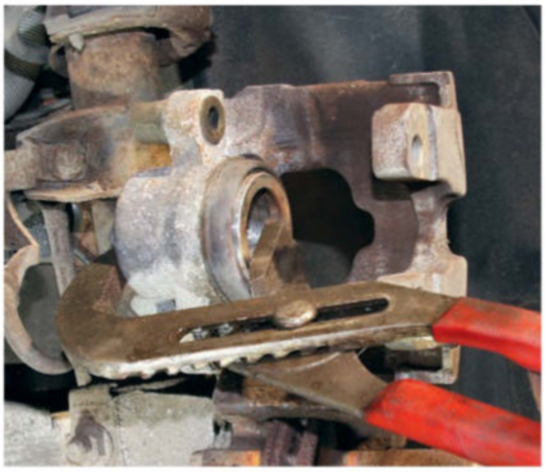
5 ◀ **Turning the steering to full lock made it easier to access the two 7mm Hex slider pins (dust covers needed to be extracted first) that secure each caliper in position. The slider pins were a little grubby, so were cleaned with abrasive paper.**



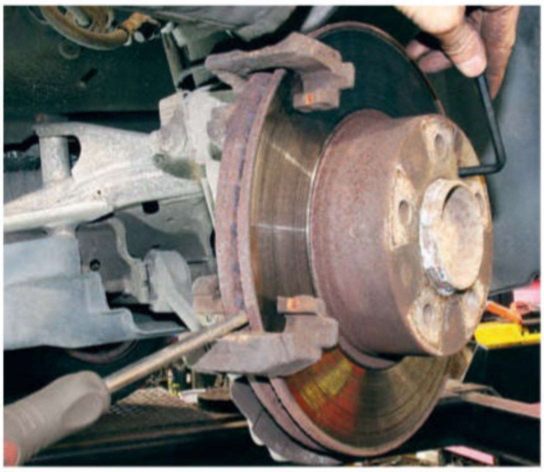
6 ▶ **The piston inside the caliper was pushed in a little by levering against the inner brake pad. This in turn made it easier to lever the caliper off and suspend it on top of the brake disc.**



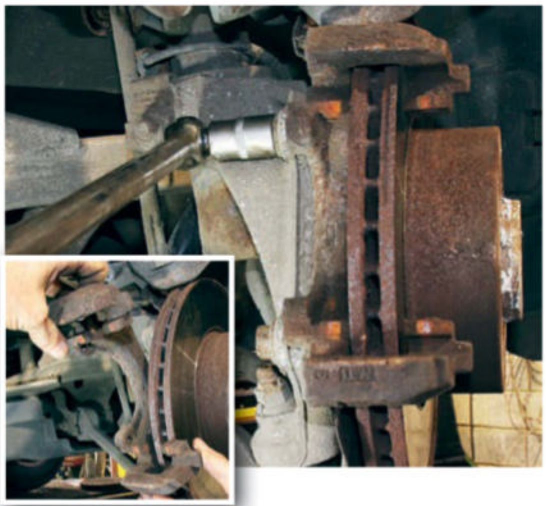
7 ◀ **The inner brake pad remained attached to the caliper on both sides because of a spring clip on the back. The outer brake pad remained on the caliper carrier for the offside but was stuck to the caliper on the nearside.**



8 ▶ **After checking the brake fluid level inside the reservoir, the piston inside each caliper was fully retracted using water pump pliers. This created enough space to refit the caliper with the new, thicker pads and disc.**



9 ◀ **Each brake disc is secured with a 6mm Hex screw, which should only be tightened to a mere 16Nm. Jamming a screwdriver into the outer edge of the brake disc and wedging it against the caliper carrier helped to stop the disc rotating when undoing the screw.**



10 ▶ **The two 18mm caliper carrier mounting bolts should have been tightened to 110Nm, but with the steering turned to full lock and a breaker bar in position, they were straightforward to undo. And the carrier was also easy to remove.**

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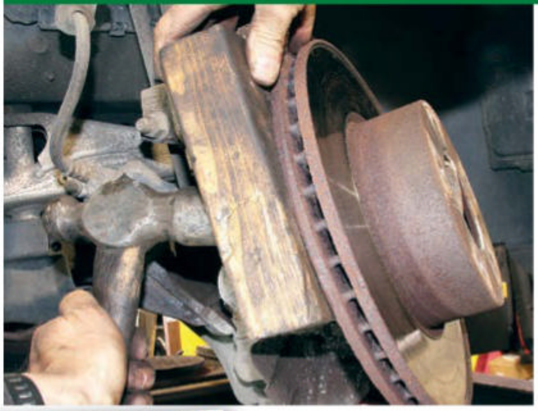
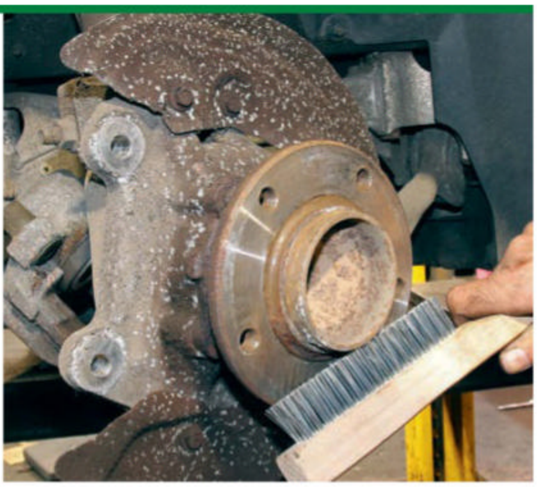
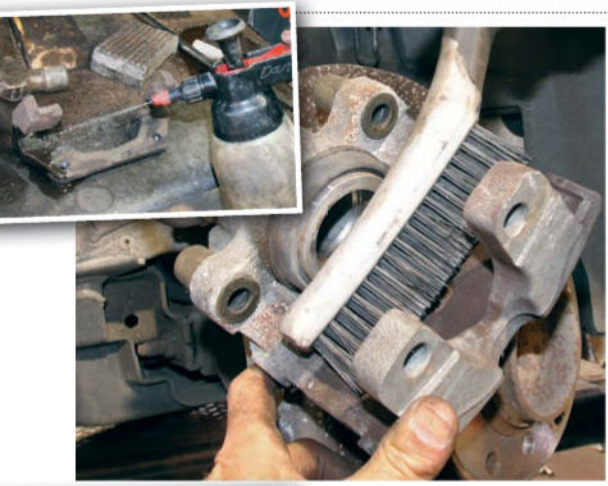
FRONT DISCS & PADS CONTINUED



11 ◀ With the brake disc seemingly ready to be removed, it wouldn't budge until Rob used a block of wood and a hammer to tap the rear face of it, rotating the disc to hit it at different points.

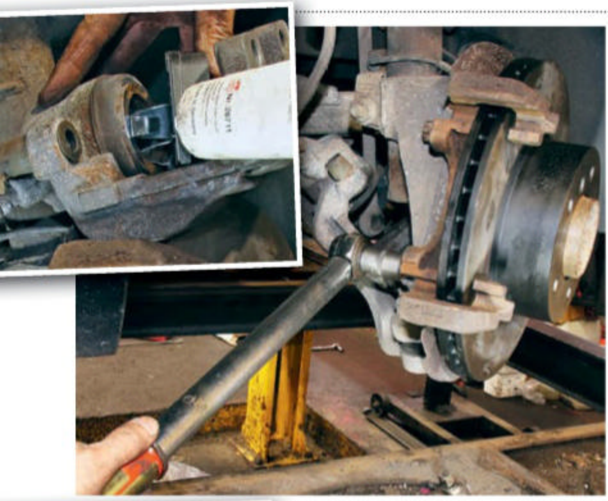


12 ▶ The mating surface on the hub didn't look too bad, but it was worth scrubbing it with a wire brush to remove some surface corrosion, which had caused the disc to be stuck to it.

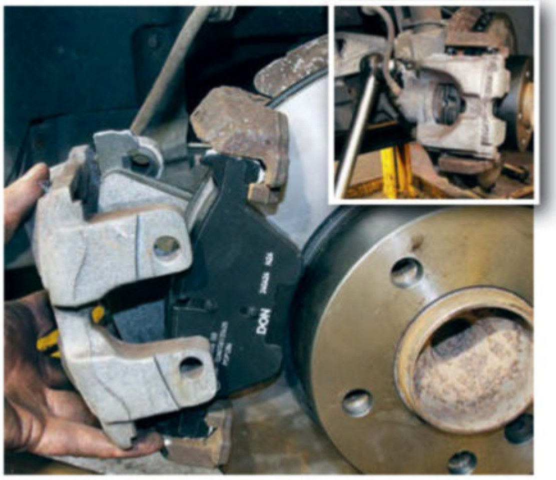


13 ◀ The caliper carrier and the inside of the caliper both needed a thorough clean with a wire brush. Spraying brake cleaner over these surfaces helped to dampen the brake dust – there was a lot of it.

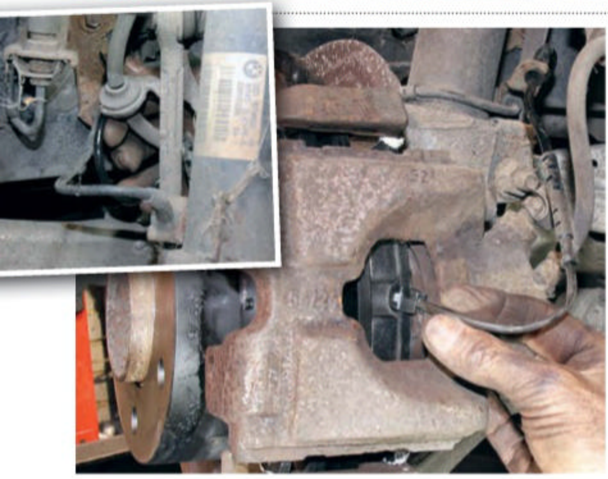
14 ▶ After checking the new brake discs were the same size as the old ones, they too were sprayed over with brake cleaner (to remove an anti-corrosion oil) before fitting and securing them with the old 6mm Hex screws (tightened to 16Nm).



15 ◀ The cleaner-looking caliper carrier was refitted, tightening its 18mm mounting bolts to 110Nm. Next, a new brake pad with a spring on its back was attached to the piston and another was fitted to the caliper carrier. A smear of brake paste was added to their edges (not the friction material).



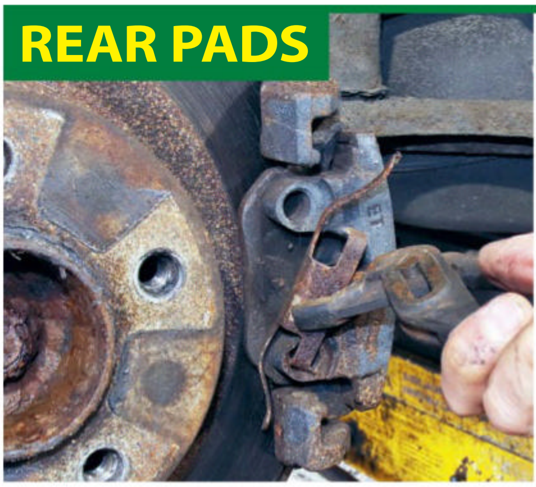
16 ▶ Having retracted the piston inside each caliper, it was easy to refit. And the slider pins were also easy to refit and tighten to 30Nm (for Teves calipers, whereas TRW calipers are tightened to 35Nm), along with the outer spring clip.



17 ◀ New wiring for the nearside front wear pad sensor was fitted into the wheelarch and connected to the rear edge of the new inner brake pad. Turning the steering to full lock, Mike pointed out the wiring was being fouled by the droplink, so it was repositioned.

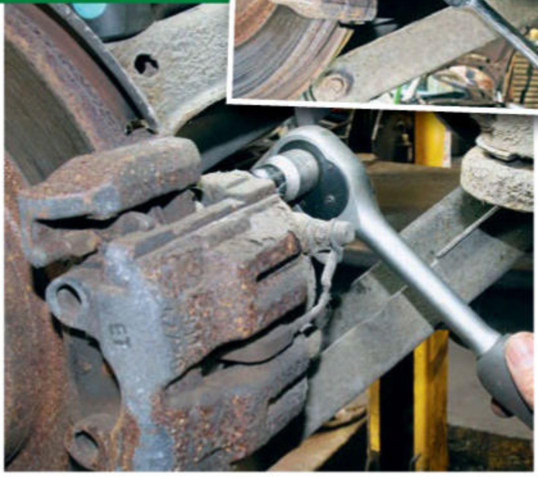
18 ▶ All that remained was to refit the road wheels and tighten the wheel bolts to 120Nm. The brake pedal was pumped to push the pistons out in the front calipers, but we still had to work on the rear brakes, so the BMW didn't move from the work area.

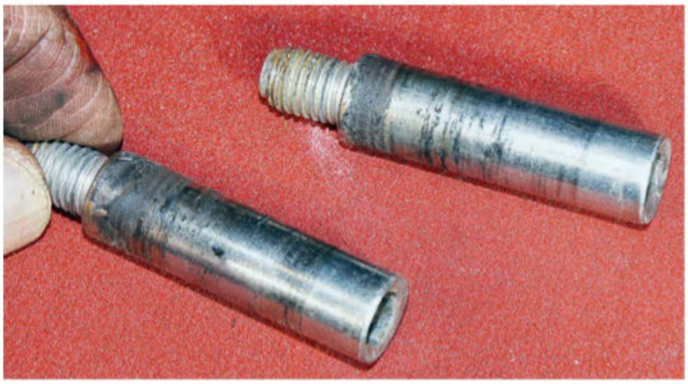
REAR PADS



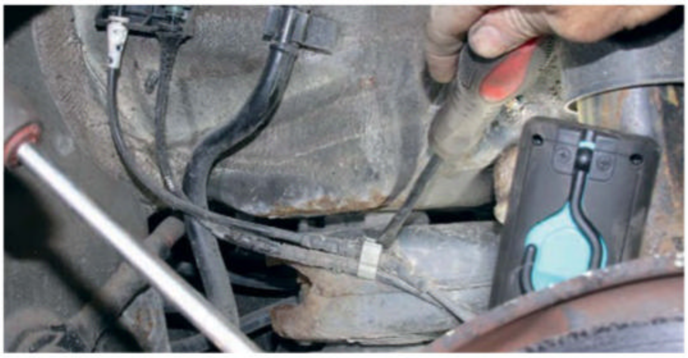
1 With little wear showing on the outer face of each rear brake disc, and the handbrake working well enough to pass the MOT test, Rob was advised to only replace the brake pads. The first job was to remove the anti-rattle metal spring clip on the outer edge of the caliper.

2 Two slider pins secure the brake caliper. Using a 7mm Hex bit, there was enough space to access and undo them with a ratchet drive. They should have been tightened to 30/35Nm (Teves or TRW caliper).

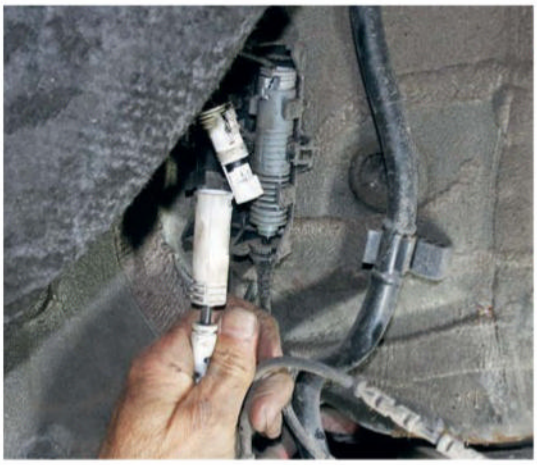




3 The slider pins should have a shiny finish to help them to move freely, but ours had some light surface corrosion, which was straightforward to remove using a sheet of P400-grade abrasive paper.

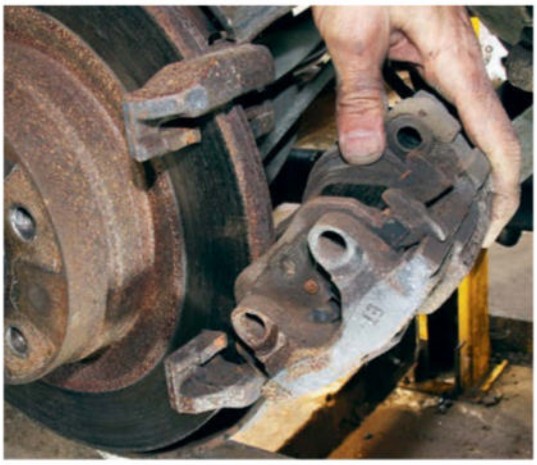


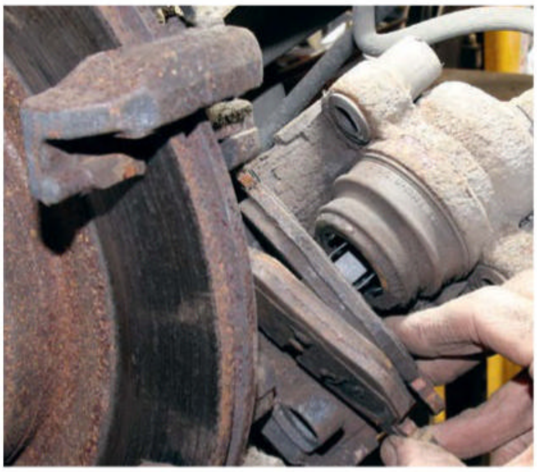
4 After undoing a 10mm plastic nut and an 8mm-headed steel trim screw, the rear of the inner wheelarch trim (OSR only) was pulled upwards to reveal the connector plug for the wear pad sensor's wiring. The plastic clips securing the wiring were released with a screwdriver.



5 And the connector plug was disconnected. Rob made sure he didn't detach the wrong one (for the ABS sensor) and made a note of how the wiring was routed around to the inner brake pad.

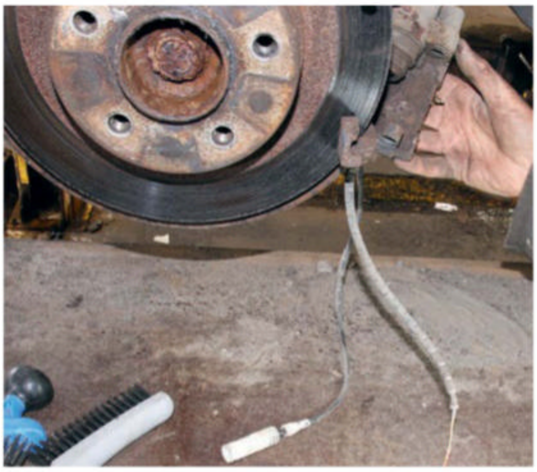
6 The caliper was straightforward to remove, offering very little resistance. Rob could now see the condition of the brake disc's inner face and it was just as clean as the outer face. There appeared to be no need to replace these discs.





7 The condition of the brake pads was close to the limit (it should be 3.7mm according to Autodata). The outer pad could have remained attached to the caliper carrier but, in this case, it stayed with the caliper. The inner pad has a spring clip that sits inside the caliper's piston.

8 Rob tried to detach the brake pad wear sensor (OSR only) from the edge of the inner brake pad, but it broke. The remains were fed through the caliper to remove the wiring (the plug at the opposite end was too large to feed through the caliper).



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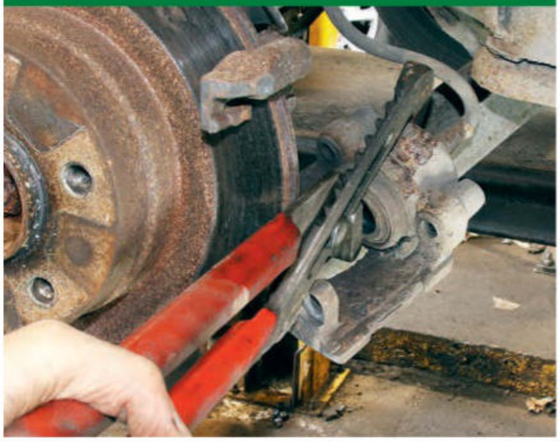
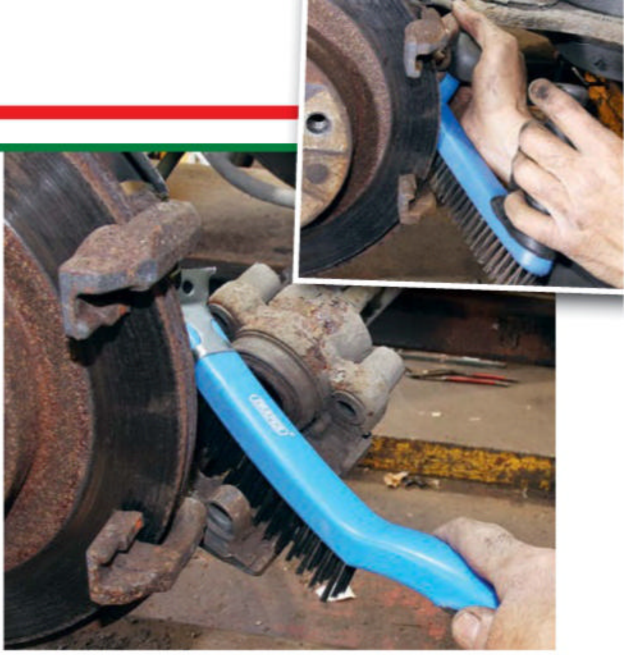
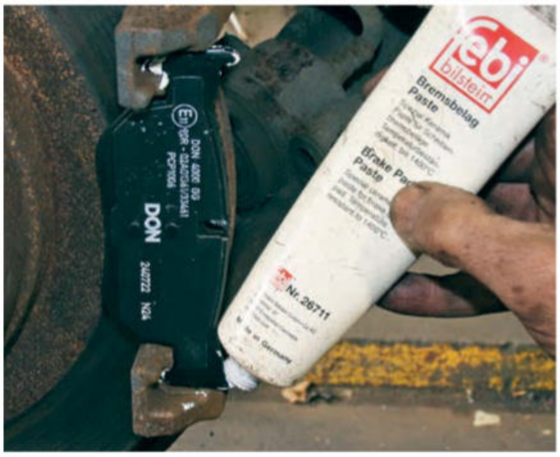
REAR PADS CONTINUED



9 ◀ With new pads to fit, the single piston inside each caliper needed retracting to create more space. After checking the level inside the brake fluid reservoir in the engine bay, water pump pliers were used to push the piston back inside the caliper.

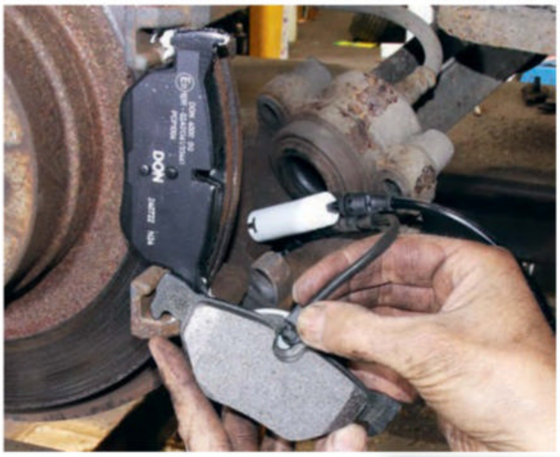
10 ▶ The inside of the caliper was cleaned with a wire brush and some brake cleaner, taking care not to damage the dust cover around the piston. The caliper carrier was also cleaned along the edges where the pads make contact.

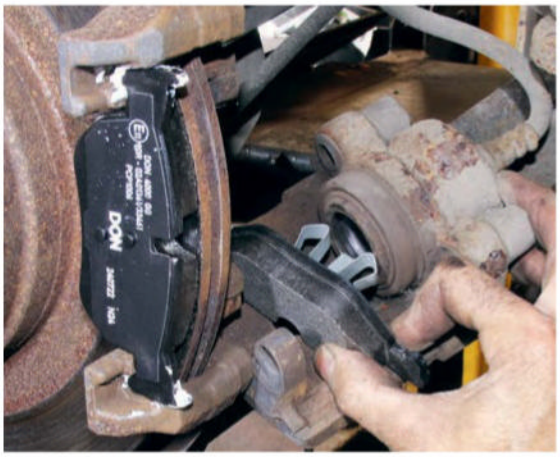




11 ◀ The new outer brake pad was fitted first, applying a smear of brake pad paste to the top and bottom edges (not the friction material) to help ensure it moves freely in the caliper carrier.

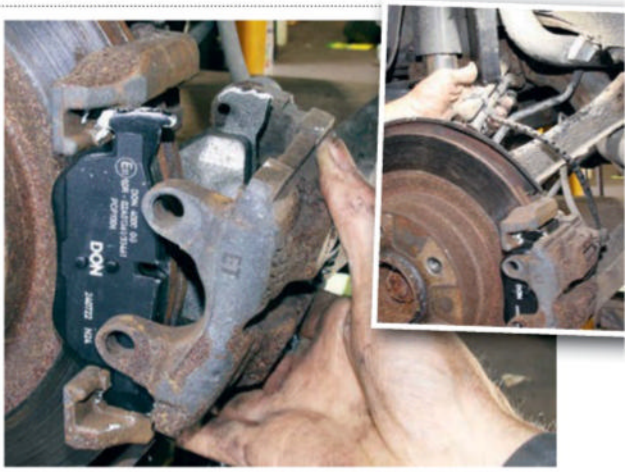
12 ▶ After feeding the new wear pad sensor wiring through the hole in the rear edge of the caliper (OSR only), the end of it (not the plug) was clipped into the rear edge of the inner brake pad.





13 ◀ Fitting the new inner brake pad into the piston was a little finger-crunching. The three metal spring clips on the back of the pad needed to be compressed a little to help force all of them inside the piston.

14 ▶ The caliper was straightforward to refit because its piston had been sufficiently retracted. The new wear pad sensor wiring was clipped into position and routed around to the connector plug.



15 ◀ The cleaned slider pins were refitted and tightened to the recommended torque setting (30Nm for a Teves caliper and 35Nm for a TRW caliper).

16 ▶ Finally, the outer spring clip was refitted, followed by the road wheels (tightening the wheel bolts to 120Nm). After pumping the brake pedal, the level in the brake fluid reservoir was checked.

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WAY AHEAD.

Help!

Your *non-diagnostic* vehicle-related problems solved by **Steve Rothwell**

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FORD MONDEO

Engine cut out

Q I have been given a 57-plate 115hp Mondeo 1.8 TDCi estate with 140,000 miles. It has been driving fine previously when it just cut out. I had only driven 10 miles from home when it failed. I called out AA who couldn't get it restarted so it had to be towed home (they did not find any DTC on his code reader).

On thinking it might have been a head gasket (as replaced a couple of months ago) I removed the oil filler cap to check for the dreaded mayo, of which it was fine.

There is also no water loss, but I found the engine oil was low, and I can confirm that the level was fine a few days ago. The engine will only start with oil cap removed with light blue exhaust gasses being emitted from filler cap, and also from the dipstick when removed.

As soon as I replace the cap, the engine cuts out. I was thinking the turbo was blocked or damaged, so I removed the exhaust pipe from the turbo and found no exhaust pressure or gasses. What is your opinion, Steve? Is a replacement turbo required? Thank you.

Steve Wooldridge

A The symptoms you have with the fact that the gasses are venting through the engine block, and that the engine will not run if the oil cap is in place, do indicated a breathing problem. This may be due to a seized turbo causing a restriction in the induction system and so the first step would be access the turbo to inspect the impeller. If this is found to be seized, then this would explain the symptoms, but if the impeller is spinning freely, then another source of the problem should be looked for.

As this was a sudden failure, and as you have checked the exhaust and found a lack of pressure, I do expect this to be related to the turbo, and if the turbo does need to be replaced you should ensure that the oil feed supply is good as this may have been the cause of the failure.

If no problem can be found in the turbo area then there may be a problem with the induction side of the engine preventing air from entering. If air cannot be inducted into the engine, then there will be no output giving the same lack of pressure scenario. This may be a blocked induction system or intercooler. Starting with the simplest points first, I would check the induction system from the air filter to the intercooler pipes and the inlet manifold and ensure that all appears to be in order.

If after these checks nothing has come to light, then I would consider carrying out a compression test to ensure that the problem is not being caused by a more serious mechanical failure.

FORD KUGA

Sinking clutch pedal

Q After 25,000 miles our 2019 Ford Kuga 1.5 EcoBoost has developed an occasional fault with the clutch pedal. Sometimes when driving and also overnight the pedal will sink to the floor of its own accord but can be raised by placing a foot underneath. It's then OK until the next time. It makes driving a bit tricky. It has been suggested that the master cylinder could be at fault but the clutch and brake systems appear to be linked with no obvious access to the slave cylinder.

I think one of your articles makes adverse reference to cars with hydraulics enclosed in the gearbox. Your comments would be much appreciated.

Bill Poleykett

A Whilst the brake and clutch systems share the same reservoir the systems are otherwise completely separate, and the clutch master cylinder could be the source of the problem. The slave cylinder is the concentric type, and it can be the case that as the clutch wears and the slave cylinder is required to throw out further than it is designed to do, air can enter the system and compromise the operation of the clutch.

In these circumstances it is normally required for the clutch system to be bled out to rectify the issue, although this is normally short lived as unless the slave cylinder is replaced the problem will return.

In your case where the pedal will suddenly drop, the most likely scenario is that the seals in the clutch master cylinder are failing, and this is allowing the pedal to drop, which once pulled up again will then return to normal operation for a while.

If there is no loss of brake/clutch fluid, and if no air bubbles can be seen rising to the surface in the reservoir when using the clutch, then I would check the condition of the clutch master cylinder where it connects to the brake pedal, and check for any signs that fluid may be seeping past the seals.

In conclusion from the details you have given, I would suspect that the clutch master cylinder is the most likely culprit of the problems.

FORD FUSION

Knock – rattle

Q I have a 2009 Ford Fusion 1.4 TDCi with 100,000 miles on the clock. I am getting a knock/rattle underneath the car when travelling on rough roads. It sounds as if it's something to do with the suspension, but I can't tell If it is coming from the front or rear of the vehicle. When I apply the footbrake going downhill it seems to stop.

Any help would be most appreciated.

Peter Pope

A As you will appreciate diagnosing noises can be a difficult task, and noise does often travel through the vehicle making it difficult to establish the original

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FORD FIESTA

Battery replacement

Q The Stop/Start on my 2020 Ford Fiesta 1.0 petrol has ceased working – even after a long journey or using a battery charger overnight. The original battery is fitted. There are no warning lights showing. Can you please advise me on necessary steps to replace the battery as I assume that it is nearing end of life? Is it advisable to connect an old fully charged spare battery, with crocodile clips, to maintain a 12-volt supply while the vehicle battery is exchanged to avoid having to reset numerous driver menu options, window closing and radio settings?

Could the same be achieved with my TOPDON booster pack? Does the Battery Management System need to be reset with diagnostic equipment after a new battery is fitted? I've tried various social media suggestions about using a combination sequence of different switch presses with the ignition on, but none work.

Colin Bennett

A **The Stop-Start system does require a good battery to operate, and I would expect that a new battery would be needed on your Ford to restore the Stop-Start operation. When fitting a new battery, this would need the use of diagnostic equipment to programme into the power management system the new battery data. This can be done shortly after fitting the battery but would need to be done to prevent the reduced battery life of the replacement battery.**

Using a battery saver device would prevent the loss of the radio code and the engine management data, but providing you do have the radio code, this can be reset easily, and the engine management data will relearn its own parameters after at least one drive cycle is completed. The TOPDON booster pack will not be suitable for this function, as it needs a battery voltage to remain active, and will not supply a current once the vehicles battery is disconnected.

The battery replacement sequence is as follows:

- **Switch off the ignition and ensure all electrical equipment is switched off. Then wait two minutes before disconnecting the battery.**
- **This is done by disconnecting the battery earth lead first, followed by the positive lead. When fitting the new battery connect battery positive lead first and the earth lead last.**

The radio code will need to be entered and the automatic windows reset, the windows are reset as follows:

- **Start the engine, and lift and hold the window switch to fully close the window. Then release switch and lift and hold again for one second. Release the switch. Then press and hold the window switch to fully open window. Release switch.**
- **Lift and hold window switch to fully close window. Release switch. This should complete the automatic setting. The process should then be repeated for the remaining windows before switching the ignition off.**
- **A short drive of the vehicle will allow the engine control and transmission control module to re-learn the parameters.**
- **The battery management system will then need programming using suitable diagnostic equipment.**

TOPDON
JUMP SURGE
JS1500
JUMP STARTER

The TOPDON battery booster which would not retain the memory in the vehicle as due to the circuits will not provide a current when not connected to a battery.

source. There are a few common points to check that can give the type of sound that you are hearing and the first of these is the anti-roll bar link arms, both front and rear link arms can give knock/rattle and upon first inspection can appear to be in good order. But the slightest movement in the link arm when felt by hand, can give quite a loud knock/rattle through the vehicle.

The rear suspension front bushes can also become soft, but this is not normally a rattle sound and so less likely to be the problem. Another area to check is that the front coil springs are complete and that a small fragment has not broken off and is sitting in the centre of the coil spring. This again can give a strange knock or rattle.

If neither of these areas is the problem, then another check to carry out would be the exhaust and exhaust shield and fixings. Often a few thumps with the side of the hand can reveal the knock.

FORD FOCUS

Heater trouble

Q A colleague has a 2008 Ford Focus Titanium 1.8 which has the heater not working and a whirring noise when accelerating – could the two be connected? The heater fan does blow, but no hot air comes out.

Dave James

A **The heater operation on the Focus operates by using a heat temperature air blender door within the heater unit, and so the coolant should continually flow through the heater matrix. The first check is to ensure that this is occurring by feeling the two heater hoses under the bonnet where they enter the bulkhead.**

With the engine at running temperature if the two hoses are hot and around the same temperature as the rest of the cooling system, then this should confirm that the heater core is being supplied. If one or both of the hoses are cool, then the problem may be a blockage. If this is the case, then it may be possible to clear the heater matrix by removing both heater hoses and then flushing it through using a hose.

This may then restore a flow to the heater and the return of heat in the vehicle interior.

If the problem is not with the flow, then it may be due to the operation of the heat blending flap in the heater unit. This is operated by an electric servo motor, and it may well be the case that the whirring noise heard is the servo motor operating but not connecting to the heater blend door in the heater unit.

The servo motors can be found at the side of the heater unit, and it may be possible to manually direct the heater blend door in the short term to ensure that warm air is available in the vehicle.

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VAUXHALL SIGNUM

Brakes

Q My friend wants to put an old car back on the road. It's a 2004 Vauxhall Signum 2.0 turbo and has been SORNED for a few years now. I put a new battery on, and it actually started quite easily and ran quite well. The clutch wasn't stuck which all gave me encouragement to continue.

Next task was to replace the discs and pads as the discs had rusted quite badly. I've done this for the front but after the brake pedal has been pressed, the pads don't back off and I can't turn the wheel by hand (with the car jacked up). I can free it by levering on the caliper but as soon as the brake pedal is pressed again it locks up again.

It uses a two-piece caliper with the slider pins running in rubber boots. The piston seems to be a plastic one. I didn't have any rubber friendly grease so sprayed them with a silicone lubricant.

Do you think if I use an appropriate grease it will help to free them up? The pins didn't slide too easy when being put in the rubber bores. Or do you think the amount of time it has laid up has done some damage to the piston bores?

The pistons retracted fairly easily with no stiff areas.

I'm at a loss to know what's happening and what to do about it. I think I've done everything correctly and even cleaned every part up properly. The only thing I can think of is corrosion on the caliper bracket hanging the pads up, though I did give them a good scrape to remove old grease and rust.

Any thoughts Steve? Could the problem lie in the brake master cylinder, with its piston sticking?

Would repeated brake application free this up? Many thanks.

Gary Mills

A The easy way to check if this is a hydraulic problem and is being caused by the brake master cylinder continuing to produce pressure, is to slacken off the bleed screw on the caliper. If the brake then frees off and fluid is pushed from the bleed screw, this will confirm that the problem is in the hydraulics and not in the caliper operation.

It may be the case that the pressure is being maintained by a faulty brake hose that has failed internally and is preventing the fluid from returning which will maintain the pressure in the caliper and so this should also be considered.

If this does not have any effect on the situation then the problem will be within the caliper, and as you can push the piston back using a lever then the most likely source of the problem may be in the slides, these do grip extremely tightly if not sufficiently lubricated and this would be worth checking.

You should also ensure that the brake pads do slide freely in the carrier, and this should be quite easy to check.

Checking each section bit by bit should allow you to eliminate the area of the problem and revel the source of the sticking brake.

VAUXHALL CORSA

Engine rattle

Q I wonder if you can give your comments on the following: Twelve months ago, I had symptoms on my 2017 Vauxhall Corsa 1.4 which sounded a lot like a slack timing chain – ie. a rattle, especially at idle speed but a bit noisy at running as well, seemed to worsen as engine warmed up. No fault lights displayed. The car covers between 8000 to 9000 miles annually – and then had on 70,000 miles.

I had a look at the job of accessing/replacing the chain in my Haynes manual and it seemed a lot more complicated than the RWD cars that I have owned in the past. I've owned cars with cambelts before the Corsa.

Anyway I consulted my usual garage, and they couldn't really help, and another garage I asked flatly refused to consider the job citing lack of special tools.

I went to yet another garage which I have used in the past. They apparently accessed the chain, but it was OK. But they cured the problem (they said) by removing the cam cover (that had to be discarded) and cleaned out the engine breather system out completely.

As I had to collect the car on a Saturday morning so there was no one available to speak to or show me the discarded cam cover that cost me £200 – they cost half that from Autovaux. The whole job was very expensive indeed.

Admittedly my Corsa runs a lot better now and the rattle has gone. This garage told me that I must have been using the wrong oil, I had been using Shell Helix 5W-30 and have also used Mobil Super 3000 5W-30. In fact, the oil had been changed twice a year, At the garage at servicing time/MOT time every March and in October I did an interim change in view of short journeys – less than 20 miles a time locally. Little on motorways as we have none in this part of Shropshire.

I presume my garage uses the correct oil but are the Shell or Mobil incorrect oils? I have owned and maintained my cars since 1968 but never had this sort of bother but admittedly cars have changed beyond recognition, due to tight emission regulations. I bought the vehicle at 12 months old in 2018, so it took up till 2023 to get bunged up.

Thanks for an excellent magazine.

Frank Bailey

A The recommended oil for your Corsa is a 0W-30 or a 0W-40 synthetic. The use of a 5W-30 Synthetic or 5W-40 Synthetic is approved for use when the ambient temperature is above -25°C. The oil recommended by Shell for your Corsa is Helix HX8 Professional AG 5W-30 and I would be quite confident that using this oil would not be detrimental to the engine. The Mobil recommended product is Mobil 1™ ESP 5W-30 and again I would be happy to use this product.

The common problem that occurs on the engine in your Corsa is that the upper timing chain guide retaining bolts become loose. This then allows the timing chain guide to marginally come away from the top of the cylinder-head allowing the oil to leak past. This then reduces the supply of oil to the tensioner and the hydraulic tappets and results in the rattle from the engine when idling.

This may have also damaged the underside of the cam cover and could be the reason that it needed to be replaced, although it is difficult to know the full situation without seeing the old parts or being present when the job was completed.

I would add that the garage you used did give you the correct information that a chain was not needed, and do appear to have cured the problem, and so I would consider that whatever work they did carry out was correctly done and has cured the problem. It may have been the case that they made the job appear a little larger than it needed to be and after tightening up the timing chain guide they have then elaborated to justify a more labour-intensive job – this would be difficult to say, but I would not expect the oil you have used to be the prime source of the symptoms that developed.

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FIAT PUNTO

Short to earth

Q I have a 2010 Punto Evo 1.4 petrol with 94,000 miles, which has been pretty good for the five years that I've had it. The engine management light is now coming on. It generally goes out after four or five starts. It stays off for a bit and then comes on at some stage, usually within a few days.

I used Multiecusan 5.0 and got the code P0555-14. This says short to ground or open circuit, intermittent. Underneath it says observe future appearance of the fault, and that the fault caused the dashboard warning light to come on. The fault clears easily with the software.

I replaced the brake pedal switch to no avail. I then found some slightly frayed wires entering the tailgate for the washer, wiper, demister and third brake light. I repaired these with liquid tape. There was no difference in the frequency of the fault occurring. It mostly happens when braking, but not always.

I'm guessing a bad connection or damaged wire. The issue is where? If you have any pointers, please let me know. I was thinking of trying to find the body control module next and trying to ensure that the brake light connections are good. Thanks in advance.

John Lunday

A The code P0555 refers to the brake booster pressure sensor and indicates that there is a circuit malfunction. This would be in the circuit of the brake pressure sensor and not the brake light circuit.

The brake pressure sensor on your Punto should be located on the bulkhead below the servo and is quite well hidden. If you trace the servo hose from the brake servo, you will find that before it enters the inlet manifold it goes through a valve. This valve has an electrical connection and is the brake booster pressure sensor which is causing the engine management light to illuminate. The sensor and vacuum hose are all one unit, and if it does require replacing the complete servo hose will need to be renewed.

The sensor is meant to detect when the brake booster pressure is low, as this will of course effect the braking effort. This is part of the Stop-Start system to ensure when the engine is stopped the brake booster pressure is sufficient.

The fault may simply be a poor connection to the sensor and the first move would be to disconnect the plug and clean it. This may be sufficient to rectify the problem.

From the details I have, the wires to the switch should be Brown/White and Black/Blue, and it would also be worth checking the engine loom for any fractures.

I received the following reply from John

Thank you for your reply. You were spot on. I cleaned the plug and the sensor socket with contact cleaner. I then used the car a lot over the weekend, and the EML has stayed off. Thanks again.

FIAT LINEA

Additives

Q I recommend *Car Mechanics* to all who are in my social circle in India. It is truly an exception, and one-of-a-kind magazine in this whole world. I am a LIQUI MOLY customer. Looks like the brand also has picked up sales in India. It is a trending top seller on Amazon. I am writing with respect to two products on sale here in India.

1. LIQUI MOLY 2009 Anti-Friction Oil Treatment (300ml) (**https://amzn.eu/d/5Pl0Evs**)
2. LIQUI MOLY 20002 Cera Tec Friction Modifier (300ml) (**https://amzn.eu/d/ciiY7Y8**)

The products are priced differently, but both are reviewed well. I have a car that has run 70,000kms in India. Model is Fiat Linea Classic Petrol 1368cc naturally-aspirated 89bhp engine. Which should I use?

They are priced differently. Kindly advise. How should the product be administered? Can you help me, as you have consistently done so in the past Steve?

Kishore Thomas John
India

LIQUI MOLY
High-tech ceramic wear protection
CERATEC
Made in Germany
300ml
Lower fuel consumption
Less friction
Engine runs more smoothly
Made in Germany

A LIQUI MOLY does have a long-standing reputation and is an additive that is recommended for its friction reduction qualities. The first product you have linked to LIQUI MOLY 2009 Anti-Friction Oil Treatment (300ml). This is an MoS2 lubrication enhancer and the additive forms a high-load lubricating film on all rubbing and sliding metal surfaces. It reduces friction and ensures smoother running of the assemblies. This results in considerable fuel and oil savings, a scientifically proven reduction in rate of wear, high operating reliability and reliable emergency running properties. For all commercially available motor oils in gasoline and diesel engines with and without a diesel particulate filter (DPF). Tested for use with turbochargers and catalytic converters. Suitable for toothed belts running in oil. Recommended dosage: 3-5% added to the motor oil. Add to max. 2% of the oil content on motorcycles with wet clutch.

Application – shake before use. Add 5% (50ml per 1 litre of oil) to motor oil; in motorcycles with a wet clutch add 2% (20ml per 1 litre of oil). Can be added to the motor oil at any time.

The second product is the LIQUI MOLY 20002 Cera Tec Friction Modifier (300ml). This is noted by LIQUI MOLY as a top product. It offers high-tech ceramic wear protection. Reduces friction and wear through ceramic compounds offering high chemical and thermal resistance. Prevents direct metal-to-metal contact, thus increasing the assembly service life. Reduces fuel consumption in gasoline and diesel engines thanks to the low-friction effect. Miscible with all commercially available motor oils and motor vehicle gear oils. For engines, manual transmissions, pumps and compressors. Is added to the respective oil. Self-mixing. Sufficient for 5 litres of oil. With a long-term effect lasting around 50,000km. Suitable for toothed belts running in oil. Not suitable for use with wet clutches!

Application – 300ml is sufficient for up to 5 litres of motor oil. Long-term effect up to 50,000km. Shake well before use!

As your Fiat does not have a wet clutch and this is not an issue, the second product the LIQUI MOLY 20002 Cera Tec Friction Modifier is considered the better option with the wider properties, and so this is the one I would select.

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CITROËN C1

Motor oil

Q This is just a general question about modern engine oils.

I maintain a family members 2005 Citroën C1 petrol 1.0 and there are several recommendations for which grade of oil to use from various data sources, all of which have given multiple choices, these being A3/B4 and also C2 and now also C3.

I've been using C2 Castrol Magnatec quite happily but I'm puzzled why C2 would be recommended in a very basic small engine that doesn't have a DPF and I assume a catalytic converter that is the same type as many small cars that aren't prescribed a C2 or C3 grade, and if the cat is sensitive to being damaged from ash then why is A3/B4 also suggested. Seems a bit contradictory to me.

Hopefully you can shed some light on it all, life used to be so much simpler, thanks.

Dean Savage

A The recommended oil for the Citroën C1 1.0 petrol is either SAE 0W-30 Synthetic (OEM PSA B71 2312) or SAE 5W-30 Synthetic (PSA B71 2290). Whilst these are the current recommended grades these exceed the ACEA classification and so can be used on all years.

Oil grades and recommendations do alter as the oil technology is advanced and so the higher grade will always be recommended. Whilst the vehicle needs will not alter the recommendation for a more environmentally sympathetic product will always be updated.

The ACEA specifications are continually reviewed and updated and oils such as ACEA A2/B2 and ACEA C1 were made obsolete as better options were developed, whilst some of the lower grades are not obsolete. Where a better option is available that will cover the remit, this is now recommended.

CITROËN C3

Brake worries

Q My daughters 2010 Citroën C3 has developed a problem with the brakes failing at low speed. If the pedal is pressed again the brakes work fine but it never happens at speed.

She has had it into the garage who adjusted the rear brakes but could find nothing wrong. I see on the internet that this is a common problem with this model, but no one can find a solution. Hoping you can steer me into a solution to the problem.

Ian Scholes

A This is a problem that I suspect is connected with the slow speeds and parking. I have seen reports on internet forums of other C3 owners complaining of this issue, and the advice given can vary widely. You have not mentioned if this is a petrol or diesel version, and this would of course alter the operation of the servo vacuum system.

There are a few factors that can affect the situation, but as this does only occur at low speeds, many of them can be discounted. If the problem was with a wheel bearing allowing excess play, which then caused the caliper piston to be pushed back, this would give a similar feeling.

Once the pedal has been pushed down, the piston will return to the outward position and the brakes restored. But this would occur at all speeds.

It would also be the case that any ABS, or master cylinder problems would also apply at any speed. Whilst a servo issue could be present at a slow speed this would cause the pedal to become hard and not to drop to the floor.

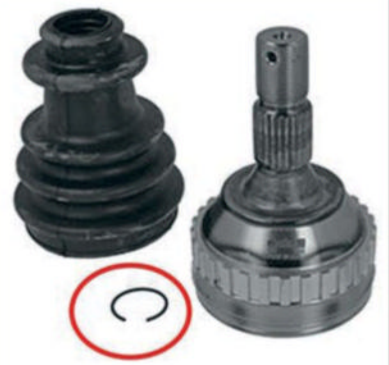
This leaves me with one possible reason that I have heard off that may be the answer to the problem. If the vehicles anti-roll bar inner bushes are worn, this can allow the anti-roll bar to slide out of position, then on hard lock, the caliper could contact the anti-roll bar and push the body of the caliper back. Then when applying the brakes, the first push of the pedal allows the caliper to be pushed

CITROËN DS3

CV joint

Q Can you please tell me how to remove the outer CV joint from the driveshaft on a 61-plate Citroën DS3 1.6 HDi? I am assuming it will either tap off or be held in place by a circlip. Can you also please tell me the torque settings for the fastenings I will remove to complete the task and the driveshaft nut torque. Thanks in advance for your help.

Craig Christie


The C-clip circled in red which holds the joint to the shaft.

A From the details I have, the CV joint at the end of the driveshaft on the 2011 DS3 is held in place with a C-clip. The official method of removal is to remove the complete driveshaft and secure the shaft in a vice and then to use a slide hammer with a threaded attachment (part number 4083-T/0410-A) to hammer the CV joint from the shaft in a swift movement.

This can often be done with care using a soft mallet on the rear face of the CV joint, or if the joint is to be replaced, then a club hammer can be used. It is the case though that if this is not done squarely, the C-clip can become lodged in the groove and removing the CV joint can then become very difficult. It is also possible to damage the groove in the driveshaft if this action is not carried out smoothly.

A new C-clip should always be used when fitting the CV joint and the Citroën workshop manual advises using a hose clip to compress the C-clip to allow entry into the new CV joint. In practice I have normally found that locating the clip centrally will allow the shaft to push into position without too much difficulty.

The torque setting will vary depending on the hub nut diameter. If the hub is 72mm then the setting is 245Nm, if it is 82mm then the setting is 312Nm. The lower swivel pinch bolt is 40Nm and the pivot fixing on the suspension strut is 55Nm. The road wheel is 100Nm.

As the transmission on this model may not have a level plug, if fluid is lost when removing the driveshaft then the gearbox will need to be drained and then refilled with the correct quantity of oil which is 2.0 litres of SAE 75W-80.

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back into position giving the brake pedal a long travel, and the next press returns the brakes to their former self.

I would certainly check this out, as the symptoms do suggest that excess movement of the pedal is due to a situation such as this.

CITROËN DS3

Wet belt

Q I am looking at the possibility of buying a DS3 with the 1.2 PureTech engine fitted, but I am apprehensive due to the bad reputation the engine has concerning the wet timing belt breaking up, swelling – and snapping before the recommended replacement date/mileage.

What is your opinion of these engines and your recommended change interval for the belt? What is the book time for changing the belt and the special tools required? Are these belts easier to change than on a Ford 1.0 EcoBoost engine?

Craig Christie

A The wet belt on the 1.2 PureTech engine is certainly easier to change than that on the 1.0 Ford EcoBoost and is given a book time of 3.8 hours. The special tools required are the setting tools for the camshafts which are part number 0109 2A (Laser part number 6200). These retail at around £180.

The belt replacement interval is given as being required at 112,500 miles or 120 months and then every 62,500 miles or 72 months. But there is also a checking interval of every 12 months or 12,500 miles. Just to confuse matters further, this is said by Autodata to be relevant only for vehicles in Belgium, The Netherlands, Luxembourg and Finland. This should be carried out by removing the oil filler cap and checking the timing belt width using special tool 0109-6. The belt should be renewed if the belt is too wide, this would indicate that the fabricate of the belt was deteriorating.

It is without doubt a major concern with these engines and due to this problem, it is imperative that a full-service history is present. The importance of the correct service regime and the use of the correct oil is an important factor in the longevity of these engines.

It is not the consideration of the belt breaking that is the highest concern, but the deterioration of the belt which may allow small particles to enter the oil system and block the oil pick-up.

I suspect that as the awareness of this common fault grows, so the value of the vehicles fitted with the wet-belt engines may decrease.

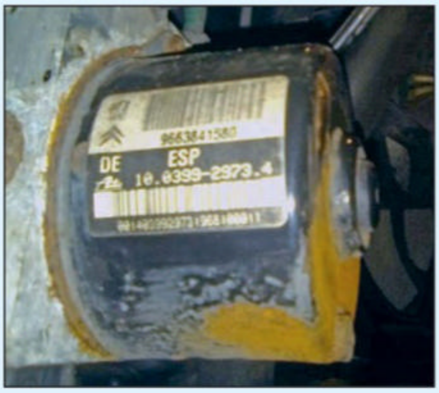
Purchasing from new, it should be possible to maintain the engine to a high degree of reliability, but purchasing second-hand I would be very wary, as previous history and conditions of use would always be an unknown factor.

CITROËN C2

Rusty ABS pump

Q I need some advice on painting an ABS pump on a Citroën C2. It is rusty in places, will it be OK to use Kurust rust convertor or Hammerite direct to rust on the pump, or should I use acid etch primer or normal primer?

Darren Dixon



A Thank you for sending a picture of the affected area. This would be best painted with Hammerite direct to rust. The area that is corroded is the body of the motor for the ABS unit and it has no connection with the fluid in the hydraulic system.

The corrosion does appear to be quite light, and I would be happy that cleaning off the loose rust and then painting with the Hammerite direct to rust would be a good option.

CITROËN C4

Rear brakes heating up

Q My son owns a 2004 Citroën C4 Picasso 2.0 HDi, which has covered 80,000 miles. He has owned it from new. When he switches on, all the relevant lights come on and they go out as the engine starts. The problem he has is that the brakes start to get hot after sometimes 100 miles or it can be after 400 miles.

He has replaced the wheel cylinders, brake linings and adjusters, brake linkages and cables, flex hoses, servo, brake master cylinder – and had the ABS unit reconditioned. The fault still remains – no lights come on the dash.

He is a motor mechanic by trade. What he has now done is to disconnect the self-adjusting linkage and has now covered 1000 miles with no problems.

Would you please be so kind as to throw some light on this problem?

P Dyson

A Unfortunately, you did not send the vehicle registration number which has made it difficult to answer this question accurately. From the information I have the Citroën C4 Picasso did not come out until 2006 and should have rear brake discs and pads, but it would appear that the 2004 model you are referring to has brake shoes and cylinders, with an automatic adjuster.

I am wondering if the vehicle is a Citroen Xsara Picasso which does have the rear brake drums and shoes, and I will answer with this in mind.

With just about every possible component replaced, and with new adjusters it would be difficult to ascertain the source of the problem, before the replacement of the servo. This would have been a prime candidate for the brakes making contact after a number of miles. A correctly operating self-adjuster should not cause the brake shoes to remain in contact allowing them to heat up as is occurring.

One possible reason may be that the brake shoes fitted are incorrect. I can see that there are several variants, and these come in different diameters, depending on whether the vehicle is fitted with ABS and ESP.

The different diameter is negligible and so would not be noticed on fitting, but it may be sufficient to cause the problems your son has with his Citroën.

The different diameters are listed as 228mm, 229mm or 230mm – and if the rest of the replacement parts have been fitted correctly as I suspect they were, then it may be the case that the brake shoes supplied were the incorrect diameter, and this may account for the problem. It will be either this or the self-adjusters fitted are faulty.

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PEUGEOT BOXER

Blue smoke

Q I own a 2016 Peugeot Boxer 2.2 150. I believe the engine is a Ford Puma. Just recently on two occasions a 'puff' of blue smoke has appeared from the exhaust pipe after a lengthy run of about 20 miles. Today it happened after slowing down to change lanes in roadworks. As I accelerated to gain speed I noticed this 'puff' of distinctly blue smoke.

The vehicle has only covered 20,000 miles and is serviced annually. It rattles somewhat from cold but soon settles down to become fairly quiet.

The other thing that bothers me a little is that it is supposed to regenerate but I have no idea if it has! It does not have an Adblue tank. The vehicle is a camper and as such must be close to its maximum weight of 3500kg. We have not had any other problems with it and it always starts and runs faultlessly (apart from that rattle).

We have owned it since 2020. Since then it has covered approximately 6000 miles. Do we have anything to worry about given that oil can damage the catalytic converter?

Peter Evetts

A Your Boxer does have a oxidation catalytic converter fitted in the exhaust system, along with a diesel particulate filter (DPF). The regeneration process on your Boxer is automatically carried-out whilst driving. This is initiated by diesel being injected into the exhaust system using an additional fuel injector. Like all systems that use diesel injected into the system for regeneration purposes there is a danger that the oil level can rise. When this happens it can cause the oil to enter the bores via the piston rings and cause a blue smoke from the exhaust due to the burning oil.

For this reason the first check to make is to ensure that the engine oil level is not above the maximum mark. If this is OK, then I would have little concern, if it is high I would advise an oil change, but again once this is done there is little need for concern.

If the DPF does need to be regenerated and this has not occurred during the normal driving cycle, then the DPF warning lamp on the dash will be illuminated.

When this occurs the vehicle should be driven for a minimum speed of 40mph for at least 15 minutes.

This should allow the regeneration to take place, if the light does not extinguish, then a forced regeneration can be carried out using diagnostic equipment. If this is required the system can also be checked for any code relating to the failure of the regeneration process.

The bottom line is that providing the oil level in the engine is correct, then I would not be concerned by the occasional puff of smoke. If this became visible whenever the vehicle was in an overrun situation, then this may be an indication of internal wear.

PEUGEOT 207

Rear brakes

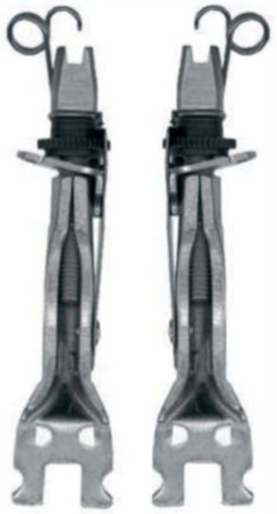
Q I've replaced the rear brake shoes on a Peugeot 207 and adjusted them up (by adjusting the adjusters through the stud holes) so that the handbrake holds after about 3-4 clicks.

The brakes work perfectly following this, however over the course of about a week to 10 days, the handbrake gets gradually worse, until eventually it doesn't hold, and the handbrake lever is virtually all the way up almost vertical.

My first thought was I must have accidentally switched the adjusters to the opposite sides, but I checked them and they were correctly fitted. However, just to be sure, I switched them over to the opposite sides, adjusted them up again and ran the car for a week. Again, the handbrake got gradually worse over the week until it didn't hold, so I was right that I had fitted them to the correct sides originally.

I put the adjusters back in their original sides and adjusted them up again, only for the same thing to happen again. I get about a week's use of the handbrake before I need to readjust the adjusters. I've been doing this for the past few months, but I need to get it sorted. Have you any idea why this might be happening?

Colin Askew



The rear brake adjusters which may be slipping back causing the loss of adjustment.

A I suspect that the problem is the adjusters which are not locking and as the brakes are applied and released. Instead of the adjusting mechanism locking against the small metal lock onto the ratchet, this is not occurring and the thread on the adjuster is being allowed to turn back, letting off the adjustment.

The brake shoe adjusters on the Peugeot are particularly sensitive in operation and are easy upset. I would check this area to ensure that the ratchet is locking against the small metal tab when the spring is in place.

If part of the adjuster is missing, which can easily occur on these adjusters, then I would get a new pair of adjusters which should solve the problem.

PEUGEOT PARTNER

Cooling fan

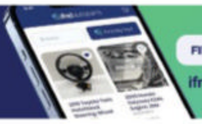
Q I have a 2014 Peugeot Partner van 1.6 diesel 92bhp DV6 with aircon which has covered 67,085 miles. When I start the engine from cold the radiator cooling fan is off, if I drive a distance of one mile, stop and check, the fan is running, the engine temperature cool, and stays on for rest of journey. When I park after ten miles or so and switch off the engine, the fan continues to run for ten minutes approximately, then stops.

On the road the temperature gauge sits at normal, no sign of overheating, no fault codes recorded, no warning lights on dash. Van drives well with lots of motorway driving. Could this be the fan control module that's mounted to the radiator front panel located next to the cooling fan or is it likely to be something else?

Is the outside temperature display shown on the dash binnacle any way connected to this problem – it's been faulty for some time and shows very high temperatures sometimes 70+ degrees or nothing.

Your help with this problem would be greatly appreciated.

James Dick



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A Autodata do note that the header tank on your model of Peugeot is prone to developing a small crack and can leak. Providing the coolant level is correct, which I suspect you have already checked, then the most likely problem is as you have suggested the cooling fan control module on the front panel.

The outside air temperature sensor has no direct connection to the cooling fan, but it does have an influence on the air-conditioning and if your vehicle is fitted with aircon and this is turned on, then you should check to see that if when turned off the fan will also stop.

It is quite normal for the engine cooling fan to run, even when the engine is not up to temperature if the air-conditioning is on, as the fan is used to cool the condenser when in operation.

The other input for the cooling fan comes via the engine coolant temperature sensor via the engine control module. If this were faulty, I would expect the gauge reading to be inaccurate.

PEUGEOT 308

Bonnet hinges

Q My son had shunt in his Peugeot 308 Mk1 resulting in the bonnet being dented, and shoved sideways bending the hinges. We have obtained good used bonnet and hinges. but I am puzzled how to remove the old hinges from the bulkhead.

Any advice greatly appreciated. My son needs the car for work, and I am trying my best to get him back on the road.

Jack Palmer

A The windscreen wiper and lower screen scuttle panel need to be removed to make access easier, then the hinge covers should be removed, these are held in place with a small friction fitting and should lever out quite easily.

Once access to the bolts is available then you should ensure that they are well lubricated with a penetrating fluid before undoing them, as it is possible that these can seize.

Once unbolted and with the scuttle panel removed, they should be manoeuvred out. The bonnet needs to be fitted and adjusted before the scuttle panel is refitted, as some adjustment may be required. The book time given for the replacement of the hinges is 0.9 hours, this is in addition to the time of 0.5 hours given for the bonnet removal.

PEUGEOT BOXER

Starter motor

Q I'm going to buy a second-hand starter motor for my 2009 Peugeot Boxer III 3.0 HDi. Please can you tell me if it is specific to the 3.0-litre – or will one off something else be the same?

Also, can you advise where I can obtain an overhaul kit for it? Thank you.

Tony Graham

The specifications of the old starter should be checked before ordering the new unit.

A From the details I have, the starter may be one of two different units and so the first thing that needs to be checked is the number of teeth on the drive gear. This may be nine or ten. Nine is the most common.

If this is the case, then flange diameter will need to be checked. This may by 62mm, 66mm or 82mm, even if the starter is sourced from another 3.0 Boxer, these measurements need to be confirmed.

Whilst I did find several starter repair kits online, the cost of a replacement starter was less than the kit and so I would not attempt to go down this route.

PEUGEOT 2008

Heater blower

Q I have a 2013 Peugeot 2008 1.2 petrol. The internal heater blower motor all of a sudden will only work at full speed, I cannot turn it up or down. The buttons on the centre console are lit and seem to display the correct view but make no difference to the setting.

I have replaced the resistor (Valeo) for a new Ridex resistor but this made no difference to the situation.

I have also checked the incoming connector for the fan as I've seen that this is common to burn out but the connection looks OK. Any help would be most appreciated.

Alan Hollingsworth

A I would have initially suggested replacing the blower motor resistor, as this would be the most likely reason for the problem. As you have already done this and it has not rectified the fault, then the problem may be associated with the heating system control unit or possibly the body control module, or it may be the motor itself.

Starting with the motor, I would check the internal resistance of the unit, if this is too high, this may be resulting in the fan not operating when on the lower settings.

The resistance of the motor should be around 4 ohms, this may vary slightly as the motor is turned, but should remain fairly stable.

If there are no problems found in the motor, then I would as a matter of course try resetting the body control module, as this can be a source of a number of strange problems.

This is done as follows:

- Open the driver's window and the bonnet, and ensure all equipment in the vehicle is switched off.
- Close all the doors and remove the key from the ignition.
- Wait for three minutes then disconnect the vehicle battery and wait a further 15 seconds. Then reconnect the battery.
- Wait for ten seconds before then reaching in through the driver's window and switching on the side lights (do not open the door). Then switch on the ignition and check system's functionality.
- Hold down the lock button on the remote fob for 10 seconds. Remove the ignition key, then open and close the driver's door, test the central locking system.
- Start the engine and check for the operation of the systems.

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RENAULT CLIO

Clutch change

Q I'm about to change the clutch in 2004 Renault Clio 182 as there is a chattering noise when depressing the pedal. I've read on various forums that, providing the clips holding the subframe nuts captive don't break, it's a simple case of (after removing shafts, etc.) loosening the offside bolts, removing the nearside ones completely, levering the frame down until there's enough room to slide the gearbox back so it rests on the frame, then squeezing in and changing the clutch. Will I have enough room to replace the guide tube using this method?

However, on said forums a couple of members say they take it out of the top, which avoids the dreaded subframe clips breaking – if they do it's almost impossible to get a socket/spanner onto the rearmost ones to counter-hold the nut. But looking at the engine it seems to me that the head protrudes a good couple of inches past the block at the flywheel end, and I can't see how the 'box would clear that if going out through the top. Have you done a clutch on a 172/182? A 1.6 or 1.9D will probably be very similar.

Anthony Pattinson

A I have indeed replaced a few clutches on different versions of the Clio II including the 2.0 petrol version which you have. The book time for the job is 7.2 hours and allows for the removal of the subframe, exhaust downpipe and steering rack.

The job can be done as you have read on the forums, without the complete removal of the subframe, by loosening the subframe bolts and dropping the subframe sufficiently to allow the gearbox to be drawn back enough to access the clutch.

I am unsure whether the gearbox could be removed through the top as suggested, and this may be referring to just the clutch assembly being drawn upwards as opposed to the complete gearbox. It is possible that when the 'box is drawn back and sitting tight up to the body/subframe, it is easier to angle it to allow the clutch to be undone and removed from above than from below.

This will of course depend on the facilities you have, as when doing the job on a ramp or over a pit I would favour working from below. In answer to your question about the guide removal, once the clutch has been removed there should be plenty of space to renew the guide tube and release bearing before refitting the clutch.

The one obstacle to replacing the clutch by this method, which I always used to call 'keyhole surgery', is that centralising the clutch can be tricky.

Depending on the clutch cover, it is normally possible to see the edge of the centre plate, and this can then be set to ensure it is even all around the circumference of the pressure plate.

RENAULT KANGOO

Radiator size

Q In previous correspondence we conversed about my daughter's 2008 Renault Kangoo 1.5 dCi. I now have a further issue... It had a slight radiator leak from the seam which I overcame temporarily with rad weld but as I am changing the cambelt and water pump decided to also change the radiator at the same time. The radiator had the original label on it Valeo 8200384071 and the core size is depth 34mm, width 458mm and length 460mm. The Valeo equivalent is 734922 which in the listing states core depth 34mm, width 451mm, length 461mm, but on receiving it the depth is 26mm and the top and bottom rails are different so although width is the same, it has 47 tubes, and the original has 48.

All the information I can get is that this is the correct radiator for the Kangoo 1.5 dCi, but I am unable to see why it is a different size and about 25% less capacity. I am hoping that you can shed some light on this and assure me that this is the correct part.

I know that supply issues sometimes mean that different parts are fitted at the factory, but this doesn't account for the size in the Valeo listing. I enclose photos.

Bob Gumbrell

A From the details I have, your Kangoo was registered on the January 26th, 2008, and so it would have been built in 2007. The radiator you have Valeo number 734922 is not exactly the same as the original 8200384071 but is not compatible with your Kangoo, though is the recommended fitment. Having looked into the possible fitments, including all the specifications and the flow rates I would be happy to use this radiator and I would expect it to perform satisfactorily.

RENAULT CLIO

Poor fuel consumption

Q I have a 15-plate Renault Mk4 Clio which has the 3-cylinder 900cc engine HB4. Whilst all is well with the car I had noticed the fuel consumption had dropped from approx. 50mpg to around 40mpg, so decided to have a look around – I was unable to find nothing untoward with engine or the running of the car.

It has covered 17,000 miles, been serviced by myself every 6000 as per Renault schedule, No EML indication, but I decided to run a diagnostic scan with my Foxwell NT644 scanner and the following code was displayed – DF1017, which I have further discovered is a faulty calculator No1 in the ECU.

Can you explain to me if this will impart the car or engines performance and what is meant by the code. Also how can I delete this code as it won't reset via the scanner. I have not yet disconnected the battery to try and clear the code.

I have included the info I got from the scanner – hope it helps in the diagnostics of it. Should there be any further info you may want I will endeavour to supply you with it.

W Nigel Jenkins

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A **The code DF1017 – COMP Control Unit actually has two possible definitions. The first indicates an internal electronic fault or failure and the second indicates a signal comparison failure. Both have the same result and indicate a possible problem within the ECU but looking at your Foxwell scan details I see a voltage displayed of 11.8 volts, this is too low and may indicate a potential battery or charging problem and this should be addressed first. The ECU will not operate correctly if not given the correct voltage.**

It may be that you had been scanning the vehicle for a time and the voltage has dropped through use. This is one of the reasons that a battery conditioner is often used during diagnostic procedures to ensure a steady battery voltage.

As an EOBD code, the Renault DF1017 translates to P061A Engine Control Module (ECM), engine torque - performance problem.

This code will not clear by disconnecting the battery and if it will not clear using your Foxwell NT644 after ensuring the battery voltage is up to 12 volts, then it would indicate a potential problem with the Engine Control Module. However, before sending this off to be tested I would ensure that the engine and body earth connections are clean and also that the ECM connections and earth are good.

If no problems can be found, and if the code will not clear with a full 12-volts supply, then you may wish to send the ECM off to be tested and repaired.

RENAULT ZOE

Electric mirrors

Q I am not sure if you can help as this is an electric car, but as the problem is not related to the drive system, I thought I would ask. After a recent charge, the electric rear view door mirrors on my 2022 Renault Zoe stopped working and will no longer fold. I have looked in the handbook but can find no fuse for them. The handbook diagram is incomplete and does not show the fuse. Can you advise me where to look?

Paul Ashton

A **I would suspect that the act of charging should not cause the mirror fuse to blow, and this may be a problem that should be referred back to the dealer under the vehicle warranty. I can though tell you that the fuses for the mirror operation are in the fusebox under the bonnet and are located in position 50.**

There are also two relays that control the folding mirrors, but as both mirrors are not operating, I do not suspect that it is the relays, and so the fuse should be the answer to the problem.

However, if the fuse continues to blow, or is found to be undamaged, then this may indicate a short within the system and as your Zoe is under warranty the dealer should assist you with this.

RENAULT MEGANE

Airbag light

Q The car is a 2005 Renault Megane II hatchback 1.6 petrol with 62km on the clock. It's a spare car I have, and in the past I have done a lot of work on it – suspension, clutch, bodywork. It has a full Renault service history. I worked in a Renault main dealer in Dublin about 12 years ago.

I bought the car about four years ago not running, it also had an issue with water leaks in the cabin, I had to remove the dashboard to cure a water leak. I have changed parts that didn't even need to be replaced, ie. clutch, starter motor, brake discs and pads, etc. I just wanted to make this car the best Megane II that was about, there are still plenty of these Megane's still on the roads of Dublin, because people are hanging on to old cars and looking after them as there is no money about, they are reliable except for electrical issues – the same as when I worked on them in the Renault dealership.

Sorry for going on a bit there – the issue I am having with this car and I don't know if that was an issue with the car before I bought it, is an airbag problem. I used my friends Autel diagnostic scanner and it came up the following codes: DTC900741, DTC90056C and DTC900761. In the UCH it came up with a fault code DF010. I then went into live data and this came up...
Line 3 Impedance 99.9 ohms
Line 11 impedance 99.9 ohms
Line 12 impedance 99.9 ohms
Line 15 impedance 99.9 ohms
Line 16 impedance 99.9 ohms

Are the 3 and 11 and 12, etc., pins in the airbag computer and that there is a high resistance in the above wires due to a bad connection or is the airbag computer at fault here. All the wiring in the car is like new, no green or black in the connections all good. Also afraid to use a multimeter on an airbag system not a good thing to do.

Gerry Kelly

A **The reading of a line impedance of 99.9 ohms is indicating a disconnected circuit.**

Starting off with the code DF010, this is indicating a fault in the airbag system, which is causing the warning light to illuminate. The lines referred to in the live data are as follows: 3 = positive connection side to lap belt pre-tensioner drivers, 11 = positive side driver's seat belt buckle contact, 12 = negative side driver's seat belt contact, 15 = positive side driver's front side chest airbag, 16 = negative driver's front side chest airbag.

As you can see these are all connected by the fact they are in the driver's seat area, and I would check the connecting plugs under the driver's seat – these would be connected to both the circuits that are showing a problem, and I would suspect that this will be the area of the trouble.

Without knowing the full details of the scanner used, it is difficult to say what the codes you have retrieved refer to – these are neither the DF Renault codes or the EOBD codes, and so I suspect they are specific to Autel. I did attempt to look these up by going on the Autel website, but found that Renault vehicles are not listed. The code would normally be followed by a description, and this would I suspect point to the same area as those I have mentioned above.

If after careful examination the fault cannot be detected and the connection appears to be in good order, then by disconnecting the battery and the plug to the UDH, then disconnecting the connections at the airbags, before using a continuity tester, the circuit can be checked. It may be the case that the wiring has broken internally, but as this is more than one circuit that is affected, I would be more inclined to suspect a disconnected plug, than four wires failing at the same time.

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RENAULT SCENIC

Starting problems

Q I have a 2002 Renault Scenic 1.6 16v with 118,000 miles on the clock. Last year I was having occasional starting problems and, having read about similar situations in *CM Help!*, decided I needed a new crank sensor.

This worked well until recently when a similar scenario occurred, but this time, on three occasions the engine has suddenly stalled. On one of these occasions I was stationary talking to a friend with the engine running and, after about five minutes, it just cut-out. Each time it restarted, but with several turns of the engine.

Is this likely to be a further problem with the crank sensor or something else?

Keith Ward

A There are two common problems which crop-up on the K4M 1.6 16v Scenic engine and the first is the crankshaft sensor. Having replaced this and it does appear that this has made a difference the other common fault is a problem with the ECU software. This can leave a series of trouble codes in the system and it would be worth checking for any codes in the system to see if this is the case. The codes which would indicate that the ECU software is the problem would be DF002 01.DEF, DF002 03.DEF, DF254 01.DEF.

The first step I would take is to check the wiring and the connecting plug to the crankshaft sensor and if no problems can be found check the ECU plug to ensure that this is not showing any signs of corrosion or a poor contact. Providing this is the case then the system should be checked for any of the mentioned codes.

If any of the above codes are found, then the system software will need updating with the latest manufacturer software.

RENAULT CLIO

Alternators

Q Are there two different output ratings for alternators. Some seem to be rated at 12V and some at 14V. The factor list a Lucas one for my 2004 Renault Clio II 2.0 16v Sport at 12V 110A but yet Bosch list it at 14V 110A. I'm guessing I need a 14V?

Anthony Pattinson

A The 12-volt and 14-volt alternator are exactly the same and it is the amperage that is important. For an alternator to charge a 12-volt system it needs to be regulated at around 14-volts, whilst some manufacturers will mark the alternator 12-volt because it is used on the 12-volt system, others will mark it 14-volt as a reference to the regulated output.

Either the Bosch or the Lucas, provided the amperage is correct will be suitable.

RENAULT CAPTUR

Key card

Q My daughter recently purchased a 2017 Renault Captur 0.9 TCe. It came with two keycards but one is always displaying low keycard battery warning on the dashboard. The card opens and closes the car and allows the car to run but even with three different new batteries it's always the same on the display. Is there a way to get this to work without the battery fault display or does she need to purchase another keycard.

Ian Scholes

A As the problem is only with the one key card, then I would suspect that the fault is within that key card. However, even though you have replaced the batteries, and this has not altered, before getting the key card replaced it may be worth trying an electrical cleaner spray on the battery contacts and in the key card.

Using a spray such as this one https://bit.ly/CMjbsCs may remove any greasy film causing a sufficient resistance to lower the perceived battery voltage sufficiently to enable the vehicle systems to detect the lower battery voltage giving the warning message.

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GENERAL

OBD scanner recommendation

Q I am in the market for an OBD scanner, specifically one with the ability to place EPBs in maintenance mode but real time data and battery information, etc., would be nice extras to have. I was wondering what your recommendation would be? I remember recently reading an article you did comparing them, however I can't find this in my pile of previous issues.

I have done some research but there is a lot on the market. Are you able to help me at all with your advice on the most suitable unit for me? Ideally it will read and reset fault codes, maintenance modes (EPB and ABS) and possibly even see real time data.

Gendan suggested VCDS as I will be using this predominantly on VAG cars, however the ability to use it on other marques would be preferable.
Joe Boycott

A **The last comparison article we covered was in October 2020. There are now a wide range of scanners available and if the scanner is to be used predominantly on VAG vehicles then the VCDS unit would be preferable, but there are a number of units that will happily read the VAG data and carry out operations such as coding on the VAG range, whilst also being compatible with other makes and models.**

If the full range of facilities is needed on a wide range of vehicles, then a professional scanner from Launch or Snap-on amongst others would be a good choice, but if budget is a factor, then there need to be a number of considerations. It may also be worth considering the VCDS for the regular VAG range that you cover and a separate system for the other vehicles.

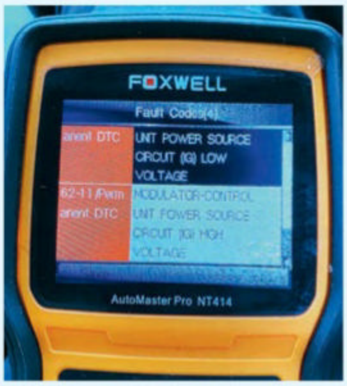
It will also depend on if you want a stand-alone unit or a laptop-based system. The laptop-based system may give more flexibility for the cost but would also include the need of a suitable laptop.

The choice of diagnostics equipment is normally a balance between cost and functionality. The more professional units will also not normally carry lifetime updates and ongoing cost must be considered when purchasing the unit.

HONDA CIVIC

ABS – traction warning lights

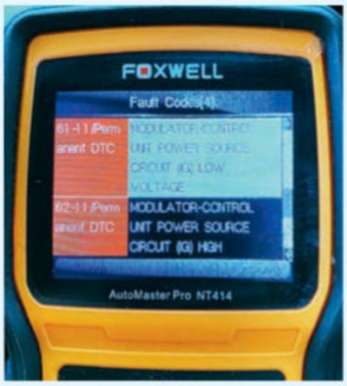
Q I wonder if you might help with an issue that came up today on my 2015 Honda Civic SR 1.8 Tourer auto. A load of warning lights all came up on the dash at once, ABS, traction and CBTA. I'm not sure if it's related but it was raining heavily, and I had been through a few big puddles so perhaps that has disturbed something. I plugged in my scanner and got the following codes:



Fault Codes(4)

anent DTC — UNIT POWER SOURCE CIRCUIT (G) LOW VOLTAGE

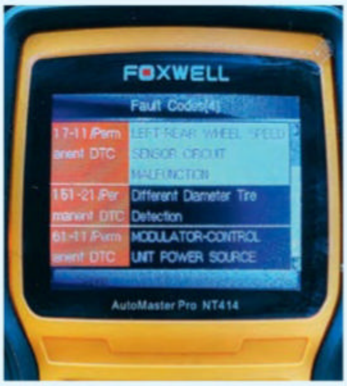
62-11 /Perm anent DTC — MODULATOR-CONTROL UNIT POWER SOURCE CIRCUIT (G) HIGH VOLTAGE



Fault Codes(4)

61-11 /Perm anent DTC — MODULATOR-CONTROL UNIT POWER SOURCE CIRCUIT (G) LOW VOLTAGE

62-11 /Perm anent DTC — MODULATOR-CONTROL UNIT POWER SOURCE CIRCUIT (G) HIGH



Fault Codes(4)

17-11 /Perm anent DTC — LEFT-REAR WHEEL SPEED SENSOR CIRCUIT MALFUNCTION

151-21 /Per manent DTC — Different Diameter Tire Detection

61-11 /Perm anent DTC — MODULATOR-CONTROL UNIT POWER SOURCE

The main one I noticed was "1 7-11 left rear wheel speed sensor circuit malfunction", so I was going to start with the ABS sensor on that wheel, or do the other codes point to anything else? I tried erasing the codes, but they came straight back when I turned the engine back on.

I would be very grateful for some guidance on how to proceed.
Rob Veltze

A **The fact that the codes come straight back without the vehicle moving is a good indication that this is a circuit problem. When the ignition is first turned on the ABS system will run a test of the system, and then providing the circuit is good, the ABS light will be extinguished. It would then return if when the vehicle is moving the information received from the sensors does not equate to the information expected.**

The code 1.7-11 along with the other codes you have 61-11 Modulator control unit power source circuit high voltage, and 62-11 Modulator control power source circuit high, also would confirm a circuit fault whilst the code 151-21 different diameter tyre detection may be the indication that the sensor is not operating correctly.

The three codes 1.7-11, 61-11 and 62-11 which are normally an indication of an internal short between the input reference and return, could be pointing to the connecting plug having been contaminated with water.

With this in mind, the first step I would take is to check the connecting plug and the condition of the loom and wiring from the left rear wheel sensor. I would then check the main multiplug on the ABS unit which is located at the offside front of the engine bay and is low down enough that this may also have been affected by the large puddles you navigated.

Whilst this may be a sensor fault, as the problem did occur whilst travelling through several puddles, and as the City Brake Assist (CTBA) along with the traction control lights also showed up with the ABS system lights, I would expect this to be more a circuit fault caused by water ingress.

If the plug and the wiring is checked and no fault found, then I would consider replacing the ABS sensor but not until the checks have been made.

SKODA FABIA

Emissions concern

Q I have a 2008 Skoda Fabia 2 1.4 TDI PD Estate. At the last MOT it was noted that the emissions were becoming higher than normal. I have noticed while driving I am experiencing turbo lag. I am wondering if this is causing emission problems. I am also looking at changing the injectors for new injectors. Can you possibly recommend a company who can supply or recondition injectors at a reasonable price?

I have recently replaced the throttle pedal assembly, after having tick-over problems. And this seems to have cured the problem.

Unfortunately, I still have emission problems, do you still have a similar vehicle in your family? It would be nice to hear of any problems that you may be experiencing through the magazine.

Barry Elston

A It would depend on the actual readings obtained. As you did kindly send in your registration number, I can see that there are no advisories on the emissions, so I am presuming that at the test these were within the tolerances. The PD injectors are very expensive, and I have known these to cover over 300,000 miles without needing replacement. For this reason, I would be wary of touching them unless they were displaying a problem such as a misfire.

The condition of turbo lag that you have would be more likely to be due to the variable veins on the turbo becoming clogged with carbon and not operating correctly. With this in mind and the emissions concern you have, I would be inclined to use a cleaner such as Cataclean Diesel to see if this helps with the turbo lag. The manufacturers claim that the additive will remove the harmful carbon build-up in the valves, injectors, oxygen sensors, EGR valve and catalytic converter, and can improve fuel economy, reduce emissions, restore performance and extend the life of engine/exhaust parts.

I would certainly go down this route first and then see what the emission readings are when the MOT is carried out.

The 1.4 Skoda that I had has now been moved on and replaced with a small van.

CATACLEAN
DIESEL
8in1
SAVES FUEL
REDUCES EMISSIONS
HELPS PASS YOUR MOT
THE COMPLETE FUEL & EXHAUST SYSTEM CLEANER

Cataclean is always a good first option to address emissions concerns.

VAUXHALL CORSA

Body control module

Q Can you help me with the proper procedure on programming a Body Control Module into my 2006 Vauxhall Corsa 1.4 (Z14 XEP engine). I have tried without much success. I bought the BCM second-hand with code which was reset with Tech2. I have access to Autel MaxiSYS 909 diagnostic scanner. Will this program it in or do I need Tech2 or Opcom to do it?

I also have the original Vauxhall Car Pass with VIN/security and radio code for the car. Any help would be appreciated.

Eric Harper

A As far as I am aware the Autel MaxiSYS 909 does not perform this function and either Opcom or Tech2 would be needed. One of the methods to get around this is to use a service such as this one https://bit.ly/CMHQbcm who will code the new BCM for you using the data from the old unit. It is also important that the SDM (airbag control module) and IPC (instrument control module) are operating correctly and communicating with the BCM.

For your reference I have attached the details from Opcom of the full procedure used.

VAUXHALL INSIGNIA

Intermittent misfire on the 1.8

Q My 2011 Vauxhall Insignia 1.8 has started to misfire intermittently. Code P0300 is stored and the EML flickers on and off sometimes. The engine runs rough and sometimes stalls or runs out of power. The plugs and coil pack were replaced a few months ago when similar symptoms appeared, so I am wondering what has gone wrong this time. The mileage is only 33K and the car has FSH. I am also getting a smell of exhaust fumes in the cab first thing in the morning, and I am wondering if this as relevant to the misfiring.

Rick Powell

A The code P0300 is indicating multiple misfire, and this can be caused from a fault within a plug or coil pack but can also be due to a mechanic issue such as valve seats or other sources such as a fuel injection or supply issue. As the problem is a returning fault and given the symptoms, the first check I would make would be to ensure that the cylinder compressions are all equal, and to ensure that the fault is not due to a deeper mechanical problem. Even with the low mileage this should always be first ruled out.

If the compressions are good, then the next step may be to check the injectors with an ohm meter to ensure that they are all giving the same resistance. With the connecting plug disconnected, the reading between the terminals should be in the region of 12.4 Ω.

I would also check the condition of the wiring and connectors at both the injector connecting plugs and the engine control module multiplug, paying close attention to the condition of the wiring as it enters the back of the connecting plug. I have seen fractures in this area that do cause such problems.

The smell of exhaust fumes may also be relevant, and it could be that the multiple misfire code is due to an air leak in the inlet or exhaust systems, causing a mixture imbalance. If this were the case, I would expect more than the single fault code you are reading, but these points would still be worth investigating.

VOLKSWAGEN POLO

EVAP problems

Q I was hoping for advice on further steps regarding a consistent issue that has been coming up on my 2003 VW Polo 1.2 regarding the EVAP/purge system for the past six months or so. The issue relates to the check engine light coming up on the dash with the code P0441 EVAP Emission Control System incorrect purge flow. Below is the chronology of events.

The EVAP valve as fitted to the reader's 1.2 VW Polo.

Around nine months ago, the dashboard light came on with code P0441, with no performance issues. I replaced the sensor sourced from a factor with same part number as the original sensor that I replaced. The light came back after a month with code P0441.

I replaced the charcoal canister with genuine VW part. The light reappeared about a month later with code P0441. I cleared the code thinking it might be a legacy code from prior to the canister being replaced.

The light reappeared a week later, so I reinstalled the original sensor thinking that maybe it was the canister all along and that the original sensor was fine. The light came back a month later with code P0441.

About two months later the light came back on, with the code P0441 and an additional code P0172 Fuel Trim, Bank 1: system too rich. I spoke to a mechanic who told me these codes are a known issue on these cars and just to clear the codes. He said the additional fuel trim code would only be an issue if the car was hard to start, heavy on fuel or emitted a lot of black smoke. None of those things have happened or are occurring. I cleared the codes and since then the EVAP code has returned twice but the fuel trim code has never returned. It usually (but not always) seems to come on after about 10 minutes of driving.

Electrical connection at sensor looks fine. I don't see any burst pipes on the EVAP system (on the pipes that are visible). The seal on the fuel cap seems to be in good order. I don't have a smoke tester or pressure tester so not sure what else to do?

I don't really see what else it could be, unless it was the sensor all along, and maybe the replacement sensor was faulty also? The mechanic I spoke said it's not an issue but as you can imagine I would prefer not to have the light coming up on the dash every few weeks.

Some background on the car in general in case its helpful... My Polo is running fine with no issues/sounds/performance. No excessive fuel consumption.

It burns a slight bit of oil, which I would say is normal for a 22-year-old car. At service time it takes 3 litres and by following service I have used the remainder of the 2 litres from the oil jug. No other engine issues/codes over past four years.

It is serviced by myself once a year which for me is about every 8000 miles. Engine service involves oil and filter replacement, air filter replacement and spark plug replacement every two years. I use 5W-30 synthetic oil.

I did have to replace the catalytic converter 18 months ago as it failed an emissions test. I don't know if that could be related/helpful? And I have noticed that the emissions results from the NCT have increased from last year compared to what they were when it was first installed. Another mechanic did tell me at the time that the new catalytic converter wouldn't last for more than a few years. I don't know if he meant that replacements in general don't last long, or because the burning oil would affect its lifespan. Any advice you could offer would be greatly appreciated.

Colin, in Dublin

A **The code you have P0441 is indicating Evaporative Emission (EVAP) system - incorrect flow detected. The most common reason for this code is due to an intake system leak or a fault with the connecting hose to the EVAP cannister. As you have already replaced the cannister, I would make a check for any induction system leaks that could be causing this problem. If after checking the system it can be confirmed that the induction system is not at any point leaking in air, then the next most likely scenario is that the fault is within the connecting hoses to the EVAP cannister. This may be the front to rear pipe from the fuel tank or the front pipe to the manifold.**

The code P0172 can also be attributed to an intake system blockage or the purge valve, and although this code has cleared and has not yet returned, it does not confirm that the problem is not still present.

I would before going any further ensure that the pipes are clear and that the induction system does not have any areas that could allow an air leak.

I do suspect that the fault will be in one of these areas.

Diagnostics Doctor

Diagnostics Doctor is a **FREE** helpline service for *CM* readers – including trade readers – who are struggling with diagnostic/engine management related faults. **Steve Rothwell** will answer all your queries. He will need as much detail as possible: **MAKE, MODEL, YEAR, ENGINE CODE** and **NUMBERPLATE** of your vehicle – and the type of management system installed. Obviously, Steve will not be able to assess the vehicle up close, so his answer will be on the basis solely of your description. This is a FREE service and it may take some time to respond to certain problems. If you would like to receive a personal response via post, please enclose an SAE.

e-mail:
cmdiagnostics@yahoo.co.uk

Write to:
DIAGNOSTICS DOCTOR
CAR MECHANICS,
KELSEY MEDIA,
THE GRANARY, DOWNS COURT
YALDING HILL, YALDING,
KENT ME18 6AL

Common abbreviations

ATS	Air Temperature Sensor
AFM	Air-Flow Meter – not a MAF type (see below). It could be, for example, a vane type
CAS	Crank Angle Sensor
CPS	Crank Position Sensor
CTS	Coolant Temperature Sensor
ECT	Engine Coolant Temperature
ECM	Electronic Control Module
ECU	Electronic Control Unit
EGR	Exhaust Gas Recirculation – meters exhaust gas back to the intake manifold
EML	Engine Management Light
EMS	Engine Management System
EPC	Electronic Power Control
EVAP	Evaporative Emissions Control System
FCR	Fault Code Reader
HT	High Tension – ignition output to the spark plugs
IAV	Idle Air Valve
ISCV	Idle Speed Control Valve – usually operated by a motor controlled by the ECU
LOS	Limited Operating Strategy – if the ECU detects a malfunction, it runs a programme to allow the car to still go, but at reduced efficiency
MAF	Mass Air-Flow meter
MAP	Manifold Air Pressure
MIL	Malfunction Indicator Lamp
PCV	Positive Crankcase Ventilation – takes crankcase gases and recycles back to the inlet system
TBPS	Turbo Boost Pressure Sensor – used by the ECU to regulate turbo output
TPS	Throttle Position Sensor
VSS	Vehicle Speed Sensor
WOT	Wide Open Throttle

Electronic Diagnostics

VW Beetle 2.0

Tracing and fixing faults in electronic engine management systems

PART TWO: Have we managed to fix the faults and ensure the EML doesn't return on a 25-year-old Beetle? **Rob Hawkins** recalls the work involved in diagnosing its dilemmas.

Having found an induction system air leak and confirmed that the catalytic converter was capable of passing an MOT emissions test in the last issue of *CM*, we were still no further forward in ensuring the EML wouldn't keep appearing on the dashboard.

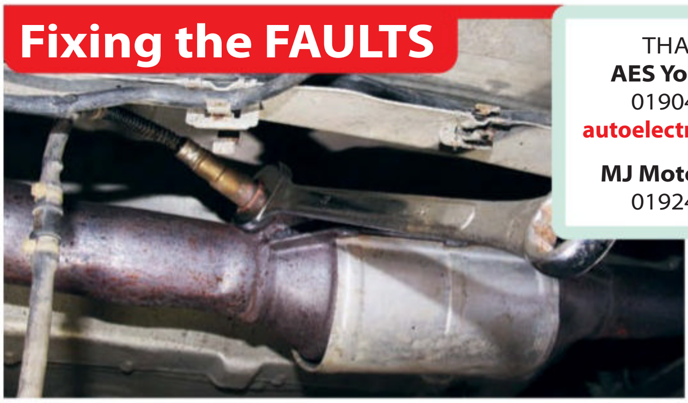
We'd also concluded that despite the aftermarket catalytic converter could pass the emissions test, it wasn't warming up quickly enough for the ECU, so this was raising fault codes relating to Bank 1 being too rich and too lean.

Mark Shipman at AES suggested there was probably another issue to address, but he needed to rule out any dilemmas with the catalytic converter, so had one solution in mind to help eliminate the warm-up parameters problem. This involved fitting a spacer between the post-cat oxygen sensor and where it's mounted into the exhaust system. It

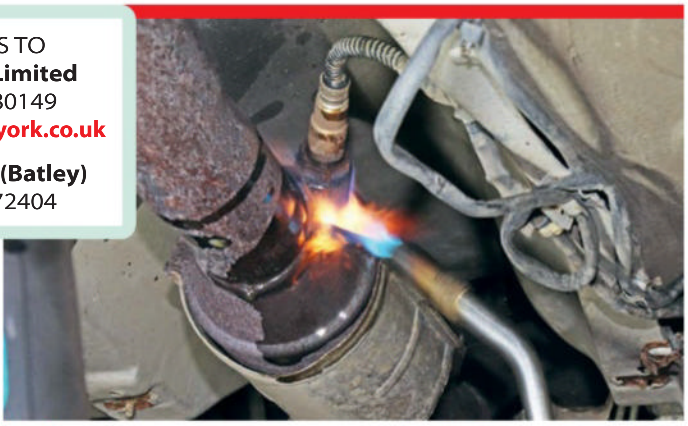
Fixing the FAULTS

THANKS TO
AES York Limited
01904 780149
autoelectricsyork.co.uk

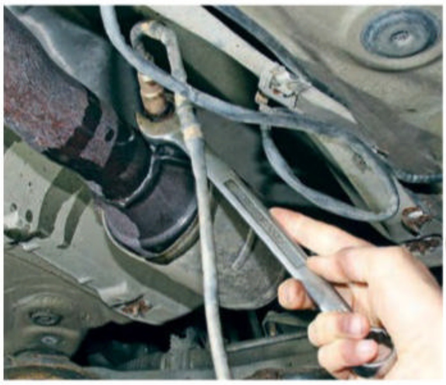
MJ Motors (Batley)
01924 472404



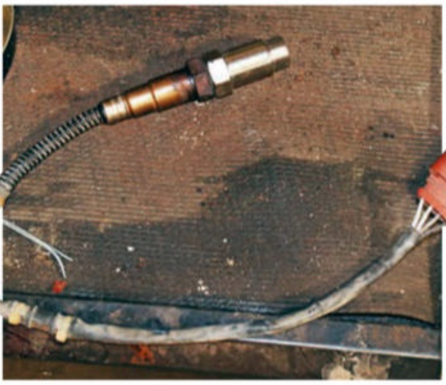
1 **The plan was to fit a spacer between the post-cat oxygen sensor and where it's mounted to help resolve the cat's slow warm-up and the ECU's time limit. The cat is accessed from underneath the Beetle. We found the oxygen sensor was difficult to slacken.**



2 **Returning to AES, Mark Shipman warmed up the post-cat oxygen sensor with a blowtorch, but didn't go too far in case it welded itself to where it's threaded into the exhaust system.**



3 **This time, the oxygen sensor was successfully slackened and removed. Detaching its wiring plug before unscrewing it helped to avoid the wiring becoming wound up and potentially damaged.**



4 **The spacer was fitted on to the end of the post-cat oxygen sensor, then the entire assembly was refitted, tightening it to the recommended 50Nm. The fault codes were cleared.**

SEALEY
P0171
System Too Lean Bank 1

5 **After roughly 50 miles, the EML appeared once again, but this time, only one fault code was logged (P0171), which related to Bank 1 being too lean. The three common fault codes we'd found before included this one, but also P0172 (too rich) and the cat efficiency being below the threshold (P0422).**

helps to dilute its reading to get around the problem of the cat not warming up so quickly. And we had proven the cat was capable of passing the emissions test, so we weren't trying to fudge the emissions figures because of a faulty cat.

At this point, it's worth noting that we realised the best course of action would be to fit a genuine catalytic converter and eliminate the issues we were experiencing with the non-genuine cat. We soon discovered this wasn't feasible when we contacted our local VW dealership, only to be told that Volkswagen had discontinued the cat and even if you could find one for sale, it would cost £2038.

One fault code

After fitting the spacer and clearing the fault codes, the EML returned once again after some 50 miles. This time, only one fault code was recorded, which was P0171 (Bank 1, system too lean).

Mark was now confident he could narrow down the root cause of the problem and suggested looking at the I/M Readiness (also known as a Readiness Test). This provides an assessment of all emissions-related equipment. The Vgate fault code reader revealed that the secondary air system had failed. This comprises an electric air pump that feeds fresh air (oxygen) into the exhaust system and, more importantly, the catalytic converter to help warm it up during the initial cold running of the engine. If there's a problem here, it won't cause any running issues, but it will raise a fault code relating to lean fuelling because the catalytic converter may not be reaching its optimum efficiency within the time limit set by the ECU. Had we discovered the source of the problem?

We inspected the condition of the electric air pump and quickly discovered that one of its three mounting nuts was missing. This shouldn't cause any issues, but we fitted a new nut to be sure. Mark explained that the body of the pump can break up and leak air, resulting in the air it generates not being fed into the exhaust system. Our pump looked OK, but we were reassured to know that the likes of febi produce a replacement.

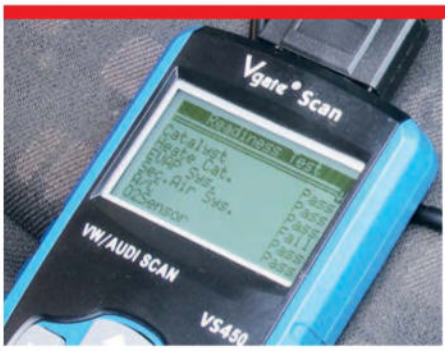
The relay switch that controls the electric pump is located in the nearside rear corner of the engine bay, so we checked it to see whether there were any signs of deterioration, corrosion or water ingress. It was spotlessly clean. Furthermore, when we ran the engine from cold, we could hear the electric pump operating.

Confident the electric pump was working (an active test using diagnostic equipment could further clarify this), we checked the plastic feed pipe from it and also the pipe from the air filter housing to the pump. Both appeared to be in good condition.

Collapsed hose

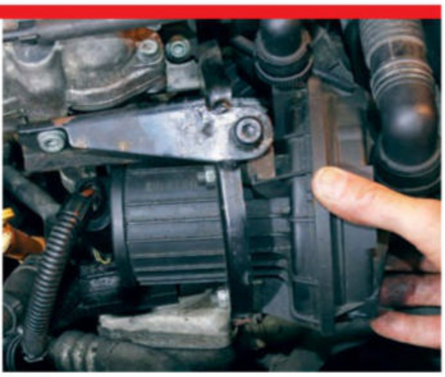
The next stage was to inspect the vacuum-operated valve that controls the secondary air pump. We found a vacuum switch hanging loose down the back of the engine bay (it should have been mounted in the nearside rear corner) and traced the two vacuum hoses connected to it. One of those hoses is routed to the aforementioned valve, so Mark suggested using his hand pump to check the valve clicks open and closed. We could hear it operating.

Whilst the vacuum hose between the switch and valve was in good condition, the other one, which is routed between



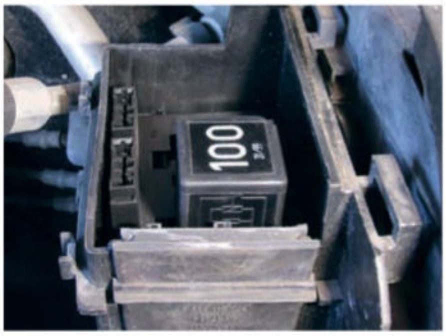
6 **Mark suggested conducting a Readiness Test to see if any emissions-related equipment was being identified as problematic. The secondary air system was listed as failed, whereas all other equipment (cat, EVAP) had passed.**

7 **The secondary air system consists of an electric pump, which feeds fresh air into the exhaust system and catalytic converter to help when the engine and cat are initially warming up. A new pump is readily available from febi, but was ours to blame?**



8 **The pump felt loose and by wiggling it, we noticed one of its 10mm mounting nuts was missing, so a new one was fitted. However, upon switching on the engine, we could hear the pump was running.**

9 **Whilst we were initially confident the electric air pump was running, we didn't know whether there were any electrical issues that meant it stopped working, such as a corroded relay switch. The relay switch is in the nearside rear corner of the engine bay. We removed this induction pipework to access it.**



10 **Hidden inside a plastic compartment in the nearside rear corner of the engine bay, we found this solitary relay switch which, as several sources explained, controlled the electric air pump. We extracted it and checked it for signs of water ingress, corrosion and short circuits. There appeared to be no issues.**

11 **With the induction pipework still removed, we traced the plastic pipe from the electric pump to the back of the engine bay, where it's attached to a valve. We noticed a small vacuum hose from the valve was connected to this switch, which was hanging down the back of the engine bay.**

the switch and an outlet on the brake servo pipe, wasn't. It had clearly collapsed, so it was replaced.

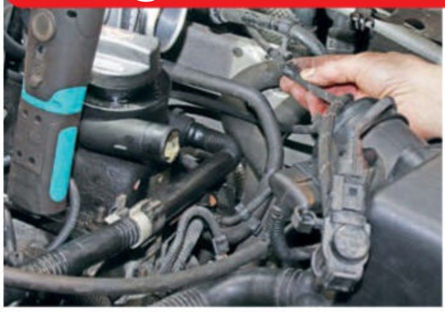
Feeling confident we had found the cause of the EML and the reason why the Readiness Test had failed on the secondary air system, we spent a weekend driving the Beetle for 150 miles to check.

Initially, all was well and we passed the 50-mile mark without a glimmer from the EML. At 65 miles, we refuelled and five miles later, the EML illuminated. Connecting the diagnostic equipment revealed the old familiar P0171 fault code, but more alarmingly, the Readiness Test now showed that everything apart from the aircon had failed!

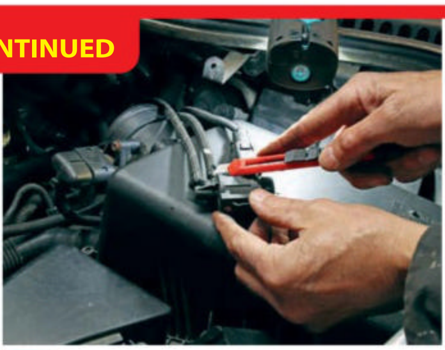
After clearing the fault codes, the Beetle lasted for another 35 miles before the EML appeared with the same P0171 code and the same list of fail points for the Readiness Test (although this test list cannot be cleared). Clearing the fault codes again managed to keep the EML off for the return journey home, which was over 50 miles.

A couple of days later, the Vgate diagnostic equipment was connected to the Beetle's ECU and this time, the VW/Audi option was selected to retrieve the fault codes. Despite the EML wasn't illuminated (we had cleared it), fault code 17536 (also called P1128) was logged, which is similar to P0171, but from the sources we examined, it specifically states that closed-loop fuelling has not been achieved for Bank 1. One description of this fault says that this indicates an issue with the fuel

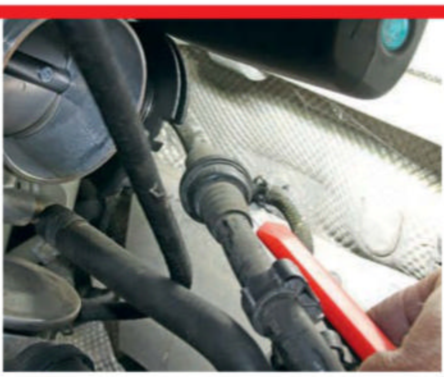
Fixing the FAULTS CONTINUED



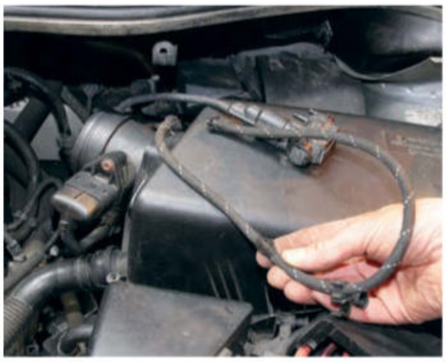
12 **We also noticed that the hose from this switch, which was routed to a connection on a brake servo pipe, had collapsed. Was this the cause of the EML problems and the secondary air system failure?**



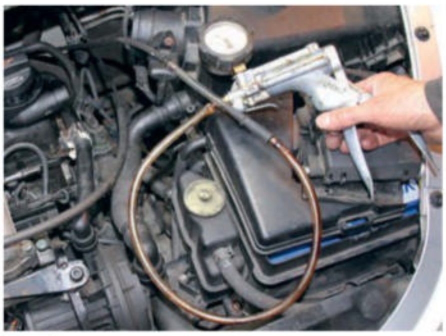
13 **Realising we had to replace the vacuum hose between the switch and brake servo pipe, Mark recommended detaching the other hose to the valve and testing the valve with a hand pump. The vacuum hoses were a tight fit – easier to cut their ends to release them.**



14 **Cutting the end of the hose where it was attached to a small plastic inlet on the brake servo pipe was particularly important – Mark explained that the outlet can easily fracture if the hose is aggressively prised off.**

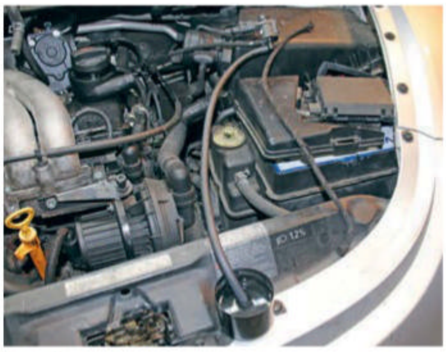


15 **We could now see that the vacuum hose between the switch and the brake servo pipe had collapsed, so this would have contributed to the reason why the Readiness Test listed a fail for the secondary air system.**

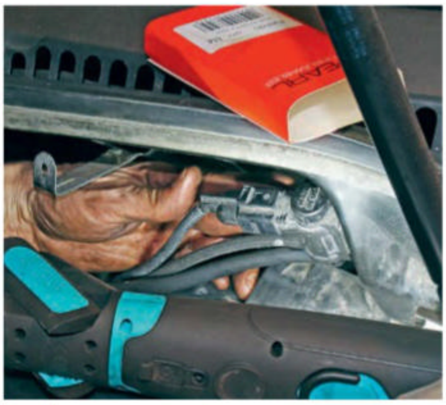


16 **Meanwhile, we connected a hand pump to the vacuum hose that's routed to the secondary air system's valve (at the back of the engine bay). Upon raising vacuum pressure, we could hear the valve click and then click again when that pressure was released.**

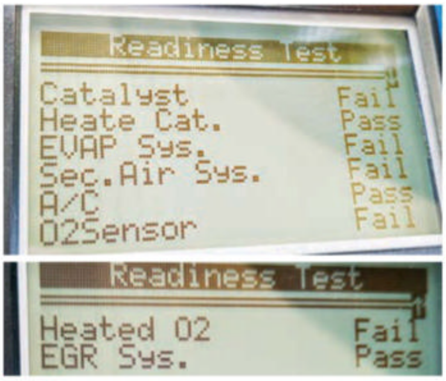
17 **A new vacuum hose for the brake servo connection was acquired and cut to length. We ordered two different sizes (of internal diameter) to help ensure we had one that would be a secure fitment.**



18 **The new vacuum hose was very much a tight fit. We didn't want to risk breaking the plastic outlets on the switch or the brake servo hose, so warmed up and softened the ends of the hose in hot water to make it easier to fit them.**



19 **Mark found the correct location for securing the vacuum switch, which was in the nearside rear corner of the engine bay where there was a suitable mounting point.**



```
Readiness Test
Catalyst        Fail
Heate Cat.      Pass
EVAP Sys.       Fail
Sec.Air Sys.    Fail
A/C             Pass
O2Sensor        Fail

Readiness Test
Heated O2       Fail
EGR Sys.        Pass
```

20 **Wondering whether we had finally fixed the Beetle's EML issues, it returned 70 miles later (5 miles after refuelling), listing P0171 again, but this time, the Readiness Test listed more fail points than before.**

management system, causing it to remain in open-loop operation, which can result in reduced fuel efficiency and other issues.

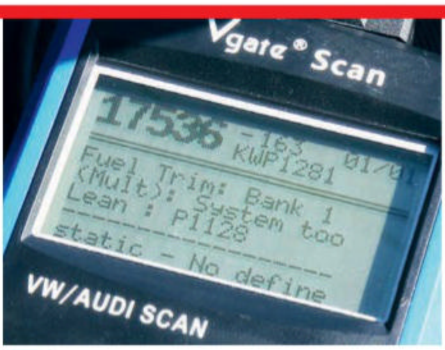
When we refuelled, the tank was filled to the brim and the mileage noted, which enabled us to calculate the fuel consumption. It was almost 31mpg, which is close to the official average of 32mpg.

The suggested reasons for this fault code and the fuelling to remain in an open-loop operation include a malfunctioning mass airflow (MAF) sensor, faulty oxygen sensors and even a faulty injector.

Circles

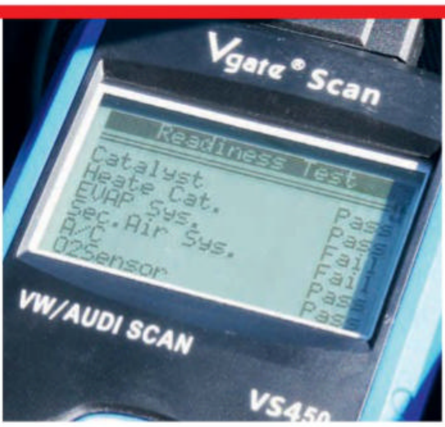
At this point, we felt we were running around in circles, but needed to continue testing and eliminating, so Mark suggested a smoke test of the EVAP. As our steps show, it was tested at both ends, forcing smoke into the fuel tank and down the hose from the tank, plus along the hose after the EVAP actuator. And we also activated the EVAP actuator to make sure it opened and closed. It did, and there were no leaks found during the smoke test.

Despite the tests found no issues, Mark wasn't going to give up, although this puzzle became even more complicated over the following weeks when the EML mysteriously switched itself off. In the next issue of *CM*, we'll be getting to the bottom of the Beetle's problems and being hit with some new ones in time for the car's MOT test.



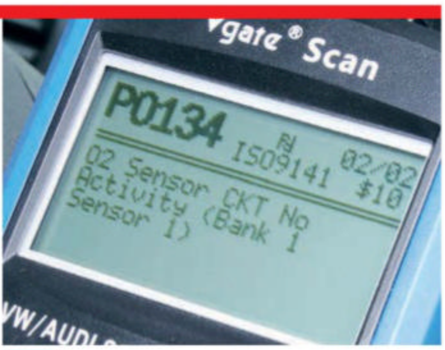
```
17536 - 163
KWP1281   01/0
Fuel Trim: Bank 1
(Mult): System too
Lean : P1128
static - No define
```

21 After clearing the fault codes, the EML returned 35 miles later with the same P0171 code, so it was cleared again. Back home, the Vgate equipment was used to look at VW/Audi faults and this time, it listed 17536 (also listed as P1128), but the EML was off.



```
Readiness Test
Catalyst        Pas
Heate Cat.      Pass
EVAP Sys.       Fai
Sec.Air Sys.    Fail
A/C             Pass
O2Sensor        Pas
```

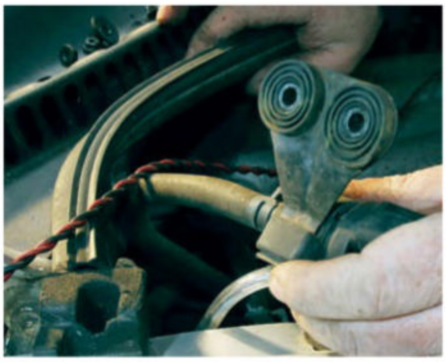
22 And the Readiness Test now showed that only the EVAP system and secondary air system had failed.



```
P0134     N
ISO9141      02/02
             $10
O2 Sensor CKT No
Activity (Bank 1
Sensor 1)
```

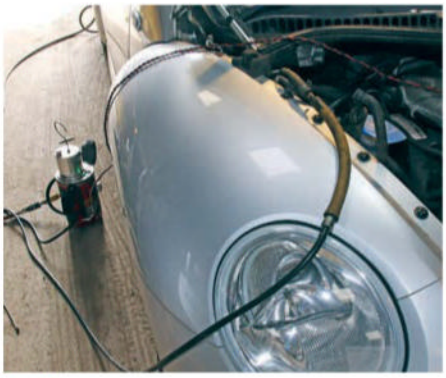
23 Over the next couple of weeks and over 100 miles, the EML eventually reappeared again, this time on the way to AES. The fault codes raised included P0171 but also P0134, which concerns no response from the pre-cat oxygen sensor.

24 Whilst the EML seemed to be pointing to the cat, Mark at AES wondered whether the EVAP was leaking, so suggested a smoke test. We started at the fuel filler neck, feeding smoke into the petrol tank.



25 Mark located the EVAP's electronic actuator (solenoid), mounted to the offside inner wing in the engine bay. We looked around the engine bay for signs of smoke, but there was nothing.

26 Wondering whether the actuator had stopped working, Mark connected his diagnostic equipment and conducted an activation test. We could hear the actuator clicking to open and close it.



27 The next thought was to see if the fuel filler cap's seal was leaking, which would create problems for the EVAP, so we connected the smoke test machine to one of the hoses attached to the actuator and...

28 ...made sure the fuel filler cap was fully fitted. After a minute, Mark released the cap to make sure the petrol tank was full of smoke (and it was because smoke poured out), then refitted it. There were no leaks.

29 The final test was to force smoke down the hose between the actuator and the inlet manifold. Any leaks here could create problems, but there were no traces of smoke from inside the engine bay.

Our Cars

Rob Hawkins

Special Contributor

Mondeo update

It's been a little over two years since *CM* bought the 2010 Ford Mondeo seen here, which has been my daily runabout and family transport for the past year or so. The recent MOT test revealed no issues, even though there's an occasional grind from the offside front strut area when turning the steering wheel, which on the day of the test wasn't evident. With over 136k on the clock, it's below the average mileage for its age, having covered 10k between the last and previous tests.

Alarmingly, the recommended service schedule states the air filter only needs to be replaced every three years or 37,500 miles. However, having replaced it in February 2023, when I checked it in March 2025, I didn't want to leave it for another year, so replaced it with a new one from febi.

New rear springs, dampers and trailing arm bushes had been fitted in January 2023, so there were no issues here and, at the front, a new nearside front damper and front discs and pads had been fitted two years ago.

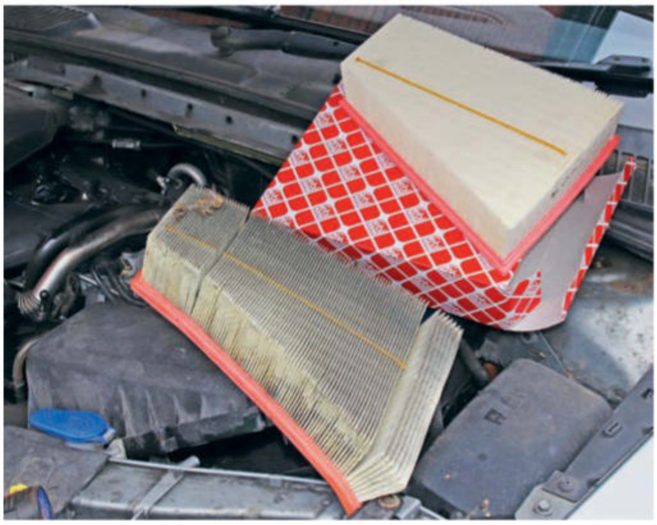
Recently, a strip and clean of all the brakes was satisfyingly straightforward. A couple of the alloy wheels had seized onto their mating surfaces, so all the wheels and hubs were thoroughly cleaned and lightly coated in copper grease. The brakes were cleaned and the pads refitted with a small amount of brake pad paste applied to the top and bottom edges (not the friction material). I've been caught out too many times with binding brakes, often caused by a sticking pad or slider pin, so I prefer to strip and clean them at least once a year to help reduce the risk of these problems.

This was more relevant on the rear brakes, which often get overlooked. And on the Mondeo, the rear brake pads sit on metal shims. Corrosion and dirt can build up underneath the shims, causing the brake pads to stick, even if they are routinely removed and cleaned. The best way to avoid this is to remove the shims and clean the area of the caliper carrier where they sit (along with the shims). It's time-consuming, but worthwhile if you want to extend the life of your discs and pads.

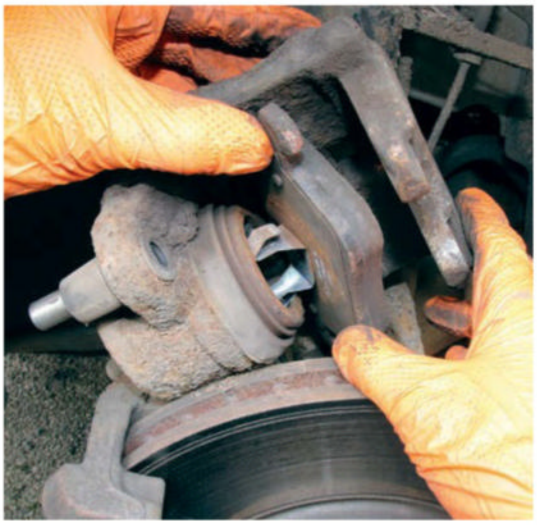
One issue I wanted to tackle concerned the paintwork and what looked like black dots stuck to the bonnet and roof. I consulted Rochdale-based Car Gods for a second opinion, and they recommended trying one of their clay bar kits. This consists of a clay bar with a lubricant to reduce the risk of scratching the paintwork.

The clay bar helps to extract ingrained dirt in the paintwork which, in this case, I couldn't remove by washing the car. I did, however, manage to remove some of them with an applicator, a little polish and a few minutes of elbow grease. This did the trick for several black dots along the bonnet, but not on the roof, where the clay bar excelled.

It was a cold day when I used the clay bar and, despite my best efforts to warm it up with my hands, the temperature of the Mondeo's roof and the air temperature probably didn't help, but I still got the results I wanted.



◀ **Last changed in 2023, the Mondeo's air filter should have another year of life remaining, but judging by its condition, Rob wisely renewed it.**



▶ **Replaced in 2023, the front discs and pads are still in good condition. An annual strip and clean helps to reduce the risk of them dragging.**

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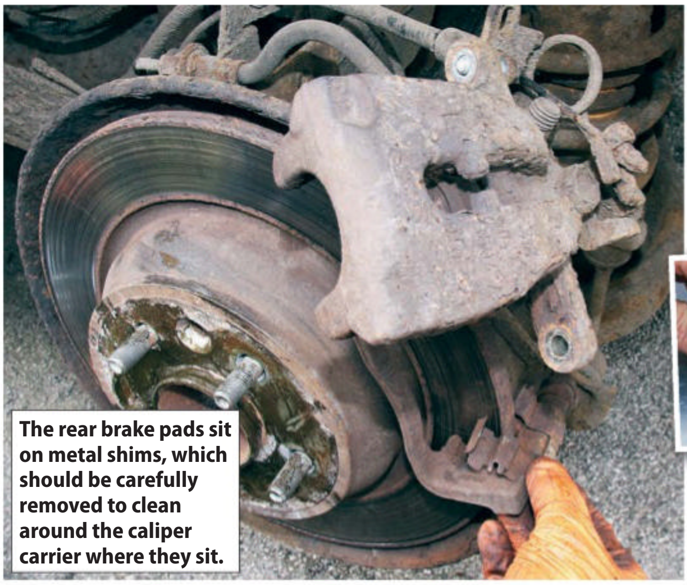
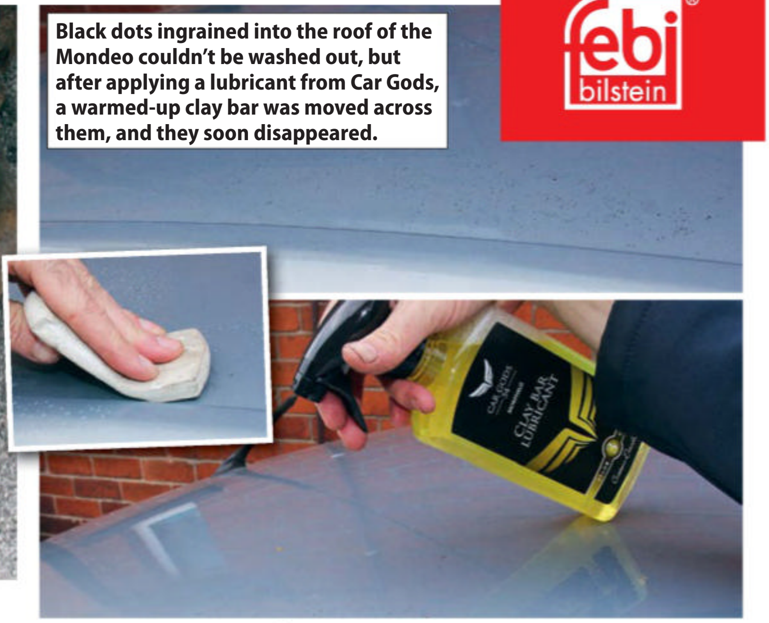


The rear brake pads sit on metal shims, which should be carefully removed to clean around the caliper carrier where they sit.



Black dots ingrained into the roof of the Mondeo couldn't be washed out, but after applying a lubricant from Car Gods, a warmed-up clay bar was moved across them, and they soon disappeared.

Another successful job concerned an engine oil service. With a message appearing on the dashboard to tell me it was due, I collected the required parts and decided to try to tackle the job on my driveway instead of manoeuvring all the vehicles to make use of the inspection pit in my garage (plus, the Mondeo is such a large car, it would be a tight squeeze inside the garage).

Looking underneath the front of the Mondeo, I was confident I could undo the 10mm bolts holding the flimsy undertray in position. I managed to undo all but one in the rearmost corner, but that was luckily enough to be able to swing the undertray around and out of the way. Plus, it made it easier to refit it, having one fastening already in position.

The next challenge was to undo the sump drain plug. The plug has a 20mm hexagonal head, but also an 8mm Hex insert. I used a suitable Hex bit and 3/8in ratchet, but even with a bike seat post as an extension tube, I couldn't undo the sump plug that was tightened to around 34Nm last year. Thinking creatively, I fitted half of the pole from my Clarke 1.25-tonne trolley jack over the ratchet, then used the other half as leverage. It worked and I managed to collect the oil in a drainer.

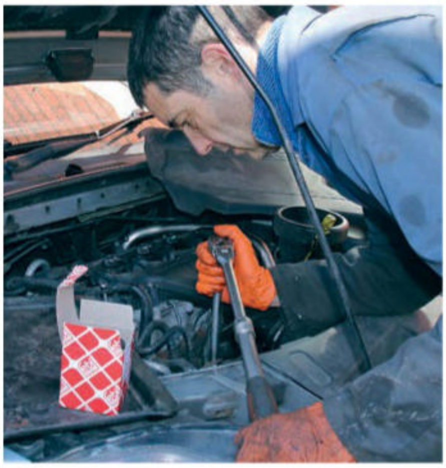
Whilst the oil was draining, I unscrewed the oil filter housing with a 27mm socket, which is accessed from above the engine bay. This helped with draining the oil.

New parts from febi were fitted, tightening the oil filter housing to the recommended 25Nm. Then I began to wonder how I could torque-tighten the sump drain bolt to 34Nm. I would have had better access through the offside front (OSF) wheelarch if the road wheel had been turned to full lock, but with no oil inside the engine, I wasn't going to run the engine to turn the steering. Instead, I raised and supported the OSF corner, removed the road wheel and there was now the space to torque-tighten the sump drain bolt.

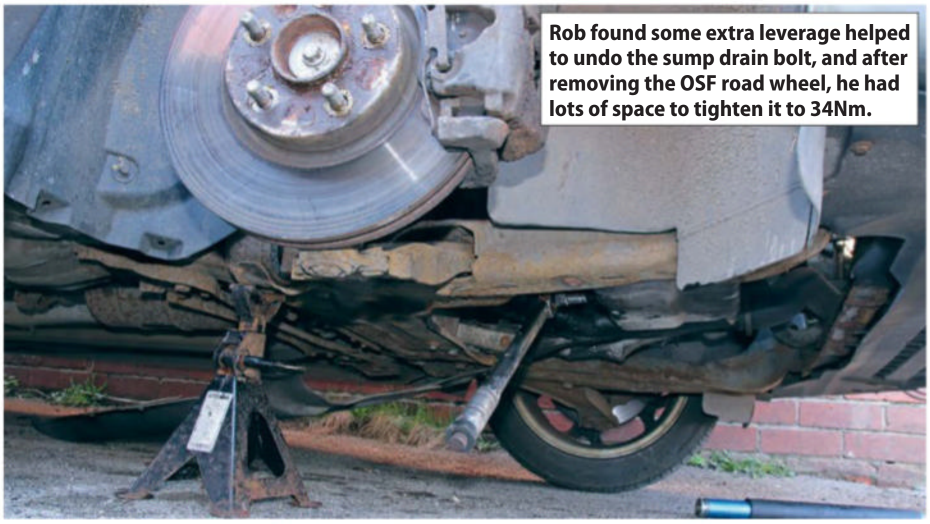
The engine should need 5.5 litres of 5W-30 fully-synthetic oil, but a little under 5 litres was added before the reading on the dipstick was at the three-quarter mark, so I ran the engine, checked for leaks, switched off and waited a few minutes before checking the level again and topping up a little.

From start to finish, the oil service had taken 90 minutes, which probably means it would have been quicker to move all the cars around on my driveway and squeeze the Mondeo over my inspection pit. I reckon I could reduce that time to around one hour, but there's no escaping the awkwardness of driveway oil changes.

I placed a 'for sale' advert in the May 2025 issue of *CM*, and the Mondeo was sold to a *CM* reader from Cornwall. I hope it continues to give good service and excellent MPG.



Driveway engine oil service took Rob 90 minutes from start to finish.



Rob found some extra leverage helped to undo the sump drain bolt, and after removing the OSF road wheel, he had lots of space to tighten it to 34Nm.

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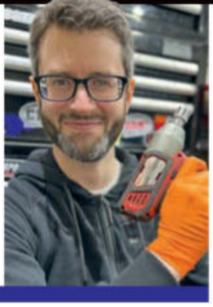


Peter Clayton

Special Contributor

Fleet update

For those following my 2006 R50 MINI 'series', you will know it went in for its first MOT after a long (three year) spell of inactivity. Having thoroughly serviced it, running the engine several times to full temperature and moving up and down the driveway a few times I was hoping it could wing a good pass. Checking the basics like tyres and lights were all in order – however tooting the horn surrendered a feeble parp and then fell silent. The fuse had blown, so there must have been some high resistance somewhere in the circuit. The horns themselves looked in a terrible state. I managed to squeeze them out of the front bumper to test them on the bench with a spare 12V battery and sure enough they were goosed. Some good used units on eBay were sourced and this restored the much needed bi-tone toot.

Come MOT day, driving on the road for the first time, I was able to stretch its legs and began to lightly apply the brakes every so often to bed them in. Halfway to the testing station however, the engine management light joyfully presented itself to me, accompanied by a sudden deceleration with the CVT autobox refusing to shift into any other 'gear' except, what felt like, the equivalent of second. I had to plant my foot down in this limp-home mode to keep up with the 30mph traffic and luckily was able to pull into a supermarket car park. Having looked down at the dash I also saw the airbag light had merrily joined the other one… this really was not my day! I turned off the engine and cranked it over again, selected drive and hoped it would behave. Luckily, it was moving properly, although the airbag light and EML were still on. As I knew my garage of choice, Stainless Creations in Falkirk, had a decent diagnostics machine, I continued my journey and began to profusely apologise for bringing a clear 'fail' to the test.

IN PETER'S GARAGE

2001 VW Lupo GTI Owned for ten years, this 1.6 pocket rocket has been stripped out for track use, having an uprated engine and limited slip differential.

2006 MINI One R50 Owned from new, this 1.6 Pepper Pack version handles amazingly well – the CVT autobox slightly tarnishes the experience. The better half's daily drive and she won't part with it.

2006 E87 BMW 130i My second summer toy – in M-Sport guise I think is quite a handsome thing with plenty of performance (and typical BMW niggles!)

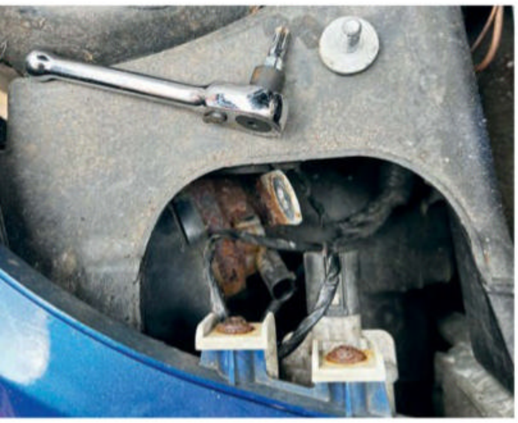
2013 Skoda Fabia My daily commuter, just enough pep from the 1.2 to get to motorway speeds. Has been the most reliable car I've owned.

I am pleased to say however, that the codes were cleared, which remained off and I had a clean sheet that day. I suspected it would be only a matter of time before those pesky codes would return. Sure enough, a few days later the airbag light came back. My diagnostics reader indicated the code 'C: MRS Airbag front passenger, stage 2'. Getting to the low-hanging fruit first I simply raised the passenger seat and checked the yellow plugs underneath. After clearing the code the light remained off, so most likely a dodgy seat connection.

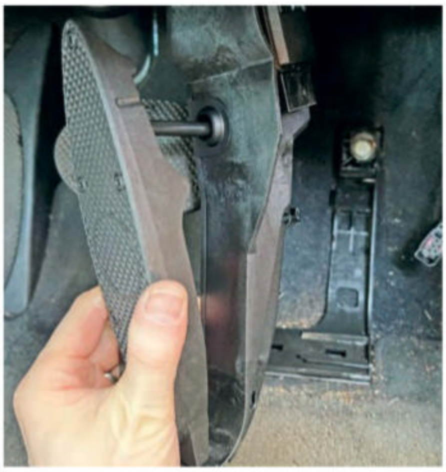
Pedalling forward

My Foxwell code reader also supplied another DME (engine) code, 'P2138: pedal-travel sensors 1 and 2 – measuring range or power output problem'. I had cleared it and as the problem didn't return I didn't think much more of it – until one frosty morning where Mrs. C needed to drive to work and after warming up for two minutes decided to go into limp-home mode within 20 metres of our house!

Having previously replaced the throttle



Horn access for the first-gen MINI is just about possible without removing the bumper cover or arch liners, but it's tight and a small ratchet tool such as this one was my choice.



No tools needed! Slide sideways towards the brake pedal to remove the throttle pedal unit.

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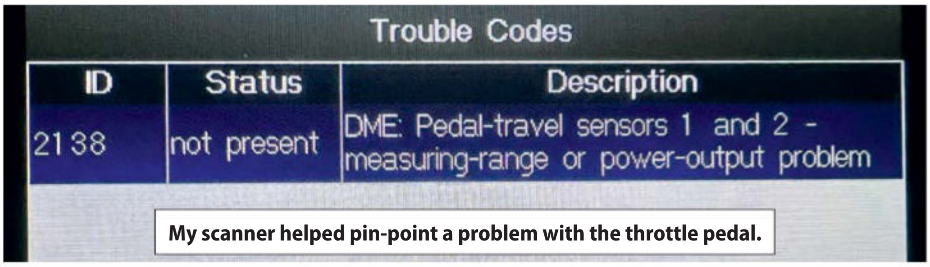


Trouble Codes

ID	Status	Description
2138	not present	DME: Pedal-travel sensors 1 and 2 - measuring-range or power-output problem

My scanner helped pin-point a problem with the throttle pedal.

Bench testing the old pedal checking each potentiometer's resistance – the old unit was showing 135 ohms (as pictured here) whereas the new unit was 56 ohms.

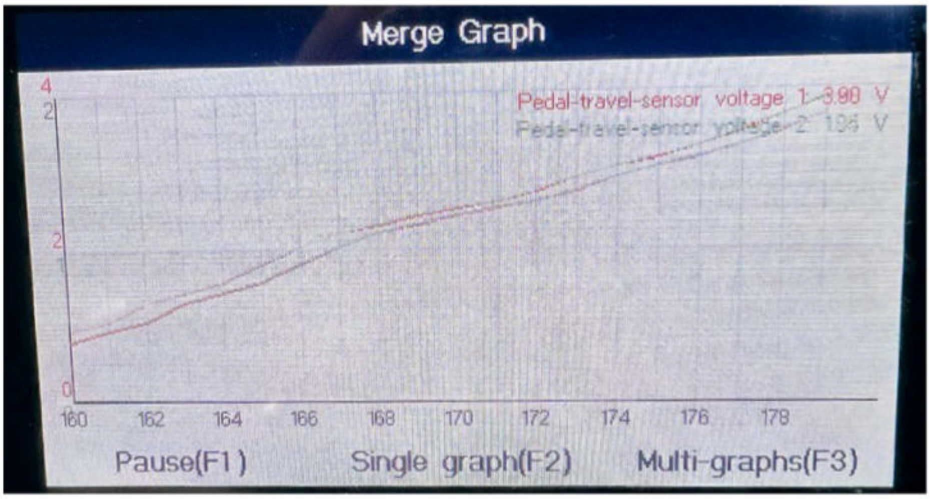
These mini grabber probes are fantastic for clipping on to the end of small electrical pins, using a needle probe in the back to then connect to a multimeter.

pedal with a used one for a different fault some time ago, I wanted to run some checks first. Removing the pedal requires no tools believe it or not – it just slides towards the brake pedal and will come off a plastic floor rail. The sensor at the back of the pedal can then be unplugged. As I had some ECU harness problems the last time, I wanted to ensure all the wiring in the loom was fine. Going blind with no pin-out diagrams to work with, only a basic wiring plan, I knew the six-pin plug had two grounds, two feeds and two signals – there are two potentiometers within the pedal for redundancy.

First, with the ECU plugged in, I checked the resistance of the ground pins to a good chassis ground which gave me half an ohm. Then, with the ignition on and engine off, I checked the voltage of the feed wires against the ground pins and got exactly 4.999 and 5.001 volts for both (so far so good for the 5V feed!). Finally, with the ignition off, I disconnected the ECU harness and ran continuity tests on the harness pins until I found the signal and grounds for the pedal sender plug. Measuring the resistance of these pins yielded half an ohm – the same value when using a good known ground. I hoped with them all being the same this meant the connection to the ECU was good, so either the pedal was faulty, or the ECU itself was defective.

The 'live data' option on my Foxwell tool actually came useful, which allowed me to measure the voltages of the signal wires. When the graph option was selected I could see that the difference between the two voltages would vary quite a bit as the pedal was slowly depressed, so my bets were on needing to replace that pedal! My first port of call was checking with febi, as they provide OE-quality electronic modules for hundreds of makes and models. Unfortunately, the pedal for the R50 MINI wasn't listed on their catalogue. While I could have risked yet another 'used' pedal from eBay, it may have well succumbed to the same fate yet again! For this reason, I decided to check with my local BMW dealer who had to call its German counterpart to ferry over the pedal unit at a lofty £200!

For a nearly 20-year-old car, the new part had only been manufactured six months prior according to the stamp on the side – perhaps these pedals are a known weak spot. Checking the electrical resistances of the old and new parts I could immediately see a difference. The new part had a considerably lower resistance, so there was some hope this would fix the issue. Sliding the new pedal into place and plugging it in, I reset all the DME codes and ran the voltage graph once more. I could clearly see that one voltage was twice the voltage of the other throughout the pedal range – different than before. Going for a few drives using different pedal positions confirmed the MINI was happy once more (including Mrs. C)!



The Foxwell scanner can graph live data, which here shows healthy graphs of both potentiometers through the full pedal range.

The MINI mount causing all the excessive noise, vibration and harshness (NVH).

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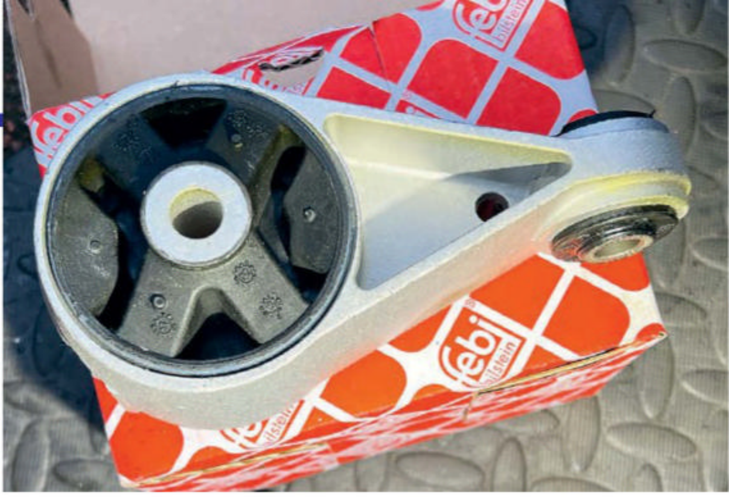
Our Cars CONTINUED

NVH and middle age

Having previously revitalised the front end of the MINI (see August 2021 of *CM*), this included replacing the rather worn lower engine mount. As the aluminium casing was in good condition I decided to press out the old bush and replace it with a Powerflex 'black' polyurethane version. This race-spec unit certainly helped improve the connection between the engine and chassis but the noise, vibration and harshness (NVH) that came as a result were just on the upper end of my tolerance.

Fast forward some years to present day and I had to wave the white flag. The plastics in the interior were rattling incessantly and the vibrations caused a blurry reflection in the rear-view mirror. Plus, the sound from the air-conditioning compressor conducted through the engine bay and cabin. I did the sensible thing and ordered up an OE specification mount from febi, which included the centre bush and casing ready to fit. The mount was fairly easy to remove after loosening six bolts: four held a bracket to the alloy sump (only fixed at 38Nm) and two for the mount itself at 100Nm each. It was well worth that job; the transformation was night and day turning the ride into a very capable, but smooth, experience!

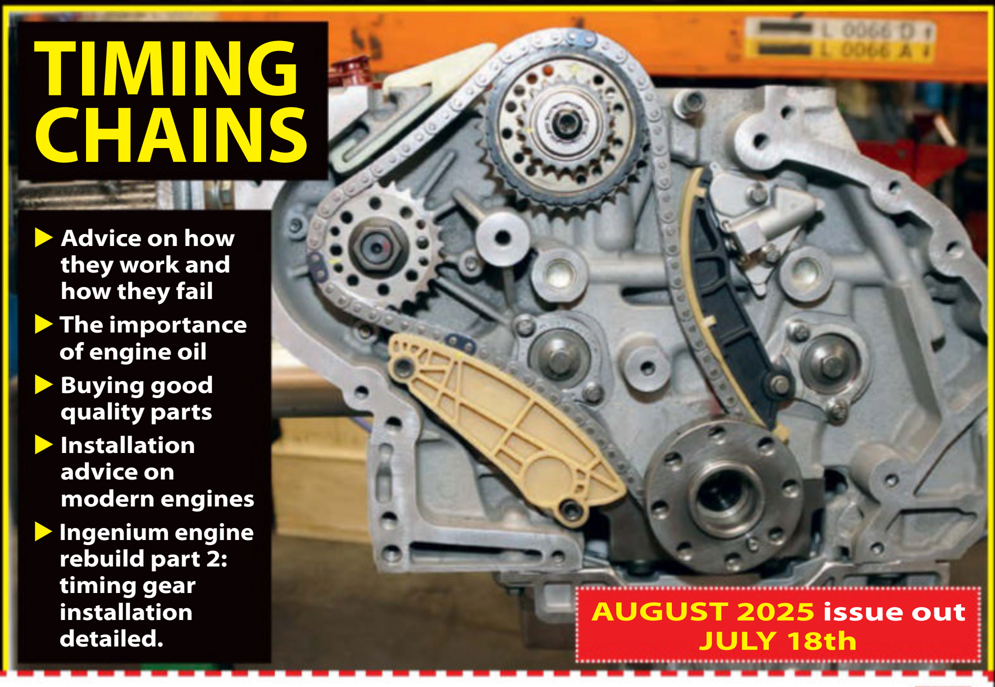


▶ While I could have opted for a non-race spec polyurethane bush for the MINI, the rubber originals are already firm enough, while able to dissipate the majority of NVH.

Having caught the bug (am I just getting to that age?), I began to look at my 2006 BMW 130i. I had also fitted a pair of race-spec transmission bushes which were secured at the back end of the 'box to the transmission tunnel via a bracket. While there were no nasty vibrations, the gears could be clearly heard clonking away at every change, and for such a nice cruiser it seemed somehow out of place. Once the undertray was removed, access was even easier than the MINI – four bolts to remove the bracket and four nuts holding the bushes in place. Another pair of original OE spec bushes were supplied by febi and to my relief quietened gear changing down beautifully.

The BMW's transmission bracket just needs removing while supporting the gearbox. The OEM mounts are more flexible and forgiving over the solid polybushes.

NEXT MONTH



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PEUGEOT 106 ZEST 3 DIESEL. 1998. 3-door. No MOT. 127,000 miles. One owner since 2001. I'm delaying sending it for scrap in case someone wants it! **£200**. **07484 157604**. Hereford.

HONDA JAZZ. 2007. 1200cc, e/windows, c/locking. CD. Serviced, MOT. 69,000 miles. **£1395**. **07527 446242**. Wales

SAAB 900 2.0 Turbo 16v SE Convertible. 1997. Leather. 93,728 miles. FSH. 4 new tyres July 2023 – driven 10 miles. Needs recommissioning. Too good to scrap. **£400**. **07501 354586**. Kent.

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2009-2012. 1.6 FSI service items, oil/air/pollen filters, etc. 2.0 GTI (4-dr model), front struts/coil springs/ wheel bearing housings/ front hubs. Nearside front door (complete no rust). Rear wheel bearing/transverse links/trailing arms/shock/coil springs. Brake discs/calipers. All parts intended for rebuild of project car. **£120** to clear (offers?). **07856 284613** for further info. Essex.

RACECHIP GTS (German) **TUNING BOX** for Ford Fiesta 1.0 EcoBoost (99hp version) 2013-2017. **£105** including postage. **01298 214110**. Buxton.

HYUNDAI LEATHER SEATS. 2010. Black with adjustable runners. From a Hyundai Coupe, 2.7 V6. Two-door car so have a lockable tilt forward mechanism. Both have seat belt stalks, adjustable headrests, whilst the driver's seat also has a base height and a lumber support adjustment. Sizes: seat base, front to back 520mm. Seat back height 110mm and width of 520mm. Floor to headrest top is 980mm. Seat runners are 450mm long when extended to front and to back are 270mm The widest part of seat is 520mm. **£200**. **07553 197917**. Surrey.

FREE TIMING GUN & ¼-TONNE CHAIN LIFT. They can be collected from Leamington Spa or I'm happy to post them off for a fee. **07840 590939.**

FORD 1972-1997 PARTS. Chassis, engine, body parts, Puma Mk1, Cortina Mk5, Escort, Transit, Fiesta, Ka, Granada. 7 boxes of spares – clearing my Dad's garage (after his passing). **£100** to clear. **07856 284613** for further info. Essex.

WANTED

HYUNDAI iX20. Interior front, passenger side, door handle. **0121 523 9613**. Birmingham.

CLASSIFIED DEADLINE for AUGUST 2025 issue: July 2nd

In my Humble Opinion

Mike Humble pops his EV cherry and tastes the future of motoring.

e:NY1 can have a change of mind

"My own needs and wants still require me to run a car with an engine (20,000+ miles yearly) but would I consider an EV with a usable range comparable to liquid fuel? I could be converted perhaps yes."

▶ The fear of change is perhaps something many, if not most of us are guilty of, especially when it comes to motor cars. You see, man (or woman for that matter) have ever since time began, been fire-starting carnivores. Our ancestors roamed the land clubbing whatever animal they could find, started a fire, cooked it, then ate it. We love our cars, they give us freedom, enjoyment and going back to our ancient roots, fire, or more to the point, a controlled explosion tempered by a right foot gives us movement and power. When it comes to electric cars, I've perhaps been a little hard on them – until recently. The lack of noise and vibration that proper engines offer, along with the smell and the underbonnet vista of smelly oily metal bits makes me sigh at the lack of soul, devoid of all those moving bits revolving at thousands of times per minute.

Very recently, I was offered the chance to try out a 100% electric car – the Honda e:NY1. As incredible as it may sound, this was my first foray into the world of EV's. For sure I have had a 'quick spin' around the block in one or two, though never actually spent some time with one. All this 'range anxiety' I keep hearing being bandied about has never affected me – again until now. What best way to test an EV than to take it for a trip to, erm, the Lake District via Preston from, erm – Horsham in West Sussex – what could possibly go wrong in a car with a 'claimed' range of a smidge over 250 miles? Well, surprisingly very little as it's been one the most eye-opening and enjoyable motor related capers I've had in quite a while.

Armed with all the necessary apps needed to keep these things on the move, I've found charging to be generally stress free, and providing you charge up at the right time using the right company, it isn't as expensive as the rumours will have you believe. I managed to roll into Charnock Richard services on the M6 with 4% remaining capacity, straight into the charging bays and in less time than it took to enjoy a coffee, a lemon muffin and a quick fag, the plucky little Honda was back to over 80% charge. The performance is not only instant when you mash the pedal into the carpet, there's a kind of hush that even *The Carpenters* would be jealous of. Rare for a modern car too is the ride comfort, the e:NY1 soaks up the miles and the bumps from our knackered roads rather well – and as with any Japanese car, has loads of standard kit. Though, don't get me started about on-board technology.

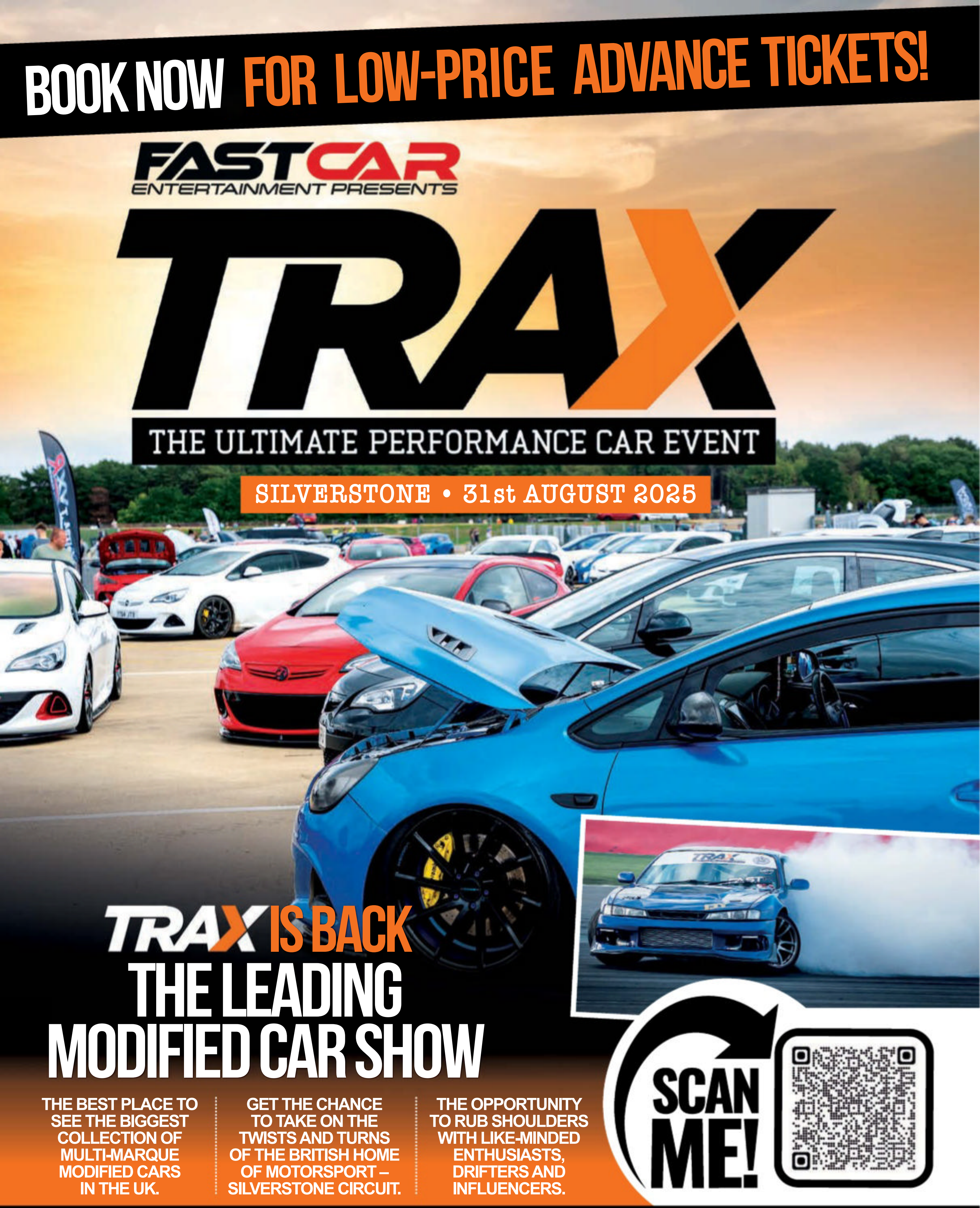
A kind of Hondaness

I recall getting giddy about my first car with central door locking and a rev counter. Fast forward to the week with the Honda – I was still finding features and functions the day before they were due to take it back to their Bracknell headquarters. Just like those Honda's of yore, like old Accords and the like, build quality is impressive – Honda's did have a dip in quality until a couple of years back. My old company Civic 2.2 i-CTDi, despite having enough torque to rip your face off, felt more brittle inside than a Lada Samara. Imagine how pleased I was to find their current stuff almost takes you back in time to when a Honda had that certain kind of Hondaness – you know what I mean, that feeling that they were unburstable.

The one downside I found though was charging it up via my outside 13A socket. From almost flat to 100% takes – wait for it – THIRTY-ONE hours. So, a fast charger is something you must invest in, not just for a Honda but any battery electric vehicle. Other highlights are nice smart looks, heaps of arm and legroom and some of the best LED headlamps I have experienced. Hammering along the M6 toll road just after midnight with no other soul in sight saw me witness an incredible high beam that turned night literally into day. But the pitifully low overall range found me on the chargers again in the small hours at Beaconsfield services on the M40 stood in the cold with a forecourt coffee and a fag, as the main service building is a hell of a walk from the charger.

A tired looking man with a Hyundai silently pulls onto the adjacent charger and enquires what car I am driving. He asks if I like it and I tell him I do, despite freezing my nuts off for three quarters of an hour waiting for it to suck up some volts. My overall thoughts are that an EV makes perfect sense for local or inter-urban work but try to do high distance motoring frequently up and down the countries motorways, you still have only a frugal hybrid or a diesel car as your sensible option – unless you like to spend lots of time sitting in a coffee shop eating lemon muffins.

I loved the silence and comfort of the e:NY1, its lavish equipment levels, the generally placid ride comfort and impressive stereo – but in top-of-the-range flavour, it's far from cheap. That said, if you are a current Honda driver looking to dip your toes into the electric market, you will love it. Despite rivals having a longer range and being quicker to charge up, the overall package is a decent one – never mind the width, feel the quality. I wanted to dislike the car purely on the grounds of it being an EV, but I couldn't. My own needs and wants still require me to run a car with an engine (20,000+ miles yearly) but would I consider an EV with a usable range comparable to liquid fuel? I could be converted perhaps yes.



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